ASSISTANCE AGREEMENT

1. Award No.	2. Modification No.	3. Effective Date	4. CFDA No.
DE-EE0002884		12/29/2009	81.087

5. Awarded To	6. Sponsoring Office	7. Period of Performance
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401	12/29/2009 through 09/30/2014

8. Type of Agreement	9. Authority	10. Purchase Request or Funding Document No.
☐ Grant ☒ Cooperative Agreement ☐ Other	109-58, Energy Policy Act 2005 111-5, Recovery Act 2009	10EE001810

11. Remittance Address	12. Total Amount	13. Funds Obligated
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Govt. Share: $50,000,000.00 Cost Share Redacted Exemption 4 Total Redacted Exemption 4	This action: $50,000,000.00 Total : $50,000,000.00

14. Principal Investigator	15. Program Manager	16. Administrator
Kulinda Davis 858-736-1778	Carol Christine Sterner Phone: 303-275-4720	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401-3393

17. Submit Payment Requests To	18. Paying Office	19. Submit Reports To
OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831		

20. Accounting and Appropriation Data

IBR

21. Research Title and/or Description of Project

RECOVERY ACT - SAPPHIRE INTEGRATED ALGAL BIOFINERY (IABR)

For the Recipient		For the United States of America	
22. Signature of Person Authorized to Sign		25. Signature of Grants/Agreements Officer [redacted]	
23. Name and Title	24. Date Signed	26. Name of Officer Melissa Wise Melissa Y. Wise	27. Date Signed 12/29/2009

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	DUNS Number: 798830688 "Electronic signature or signatures as used in this document means a method of signing an electronic message that-- (A) Identifies and authenticates a particular person as the source of the electronic message; (B) Indicates such person's approval of the information contained in the electronic message; and, (C) Submission via FedConnect constitutes electronically signed documents." The administrative office (administrative contracting activity) for this award/modification/amendment is 03601 from STRIPES. The administrative office (administrative contracting activity) code is needed by the contractor/recipient for reporting to FederalReporting.gov concerning awards made with funding from the American Recovery and Reinvestment Act of 2009 (ARRA or Recovery Act). 1. This is a conditional award, comprised of this Assistance Agreement and the Special Terms and Conditions. Upon successful completion of negotiations, this award will be modified to lift its conditional status, to revise the Special Terms and Conditions, and to add additional attachments, such as Attachment 1, Intellectual Property Provisions; Attachment 2, Statement of Project Objectives; Attachment 3, Federal Assistance Reporting Requirements; and Attachment 4, Budget Information - Non Construction Programs. 2. The award was prepared using the proposed budget information in the Recipient's application. The Special Terms and Conditions, Provision 1 of the award states DOE will not release the funding obligated by this award until successful completion of negotiations are reached to the satisfaction of the Contracting Officer. Performance against this award is, therefore, at the Recipient's own risk, and payments for costs incurred for the Recipient's project will not be made until completion of negotiations. 3. The administrative office for this award is 03601. The administrative office (administrative Continued ... contracting activity) code is needed by the				

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	recipient for reporting to FederalReporting.gov concerning awards made with funding from the American Recovery and Reinvestment Act of 2009 (ARRA or Recovery Act). Recipients must report to FederalReporting.gov by the 10th day of each quarter. 4. A representative of the DOE office will contact the Recipient to request additional and/or revised information needed to supplement and clarify the Recipient's application, to complete the negotiations of an amended award. DOE Award Administrator: Molly Hames E-mail: molly.hames@go.doe.gov Phone: 303-275-4864 DOE Project Officer: Christy Sterner E-mail: christy.sterner@go.doe.gov Phone: 303-275-4720 Recipient Business Officer: Kulinda Davis E-mail: kulinda.davis@sapphireenergy.com Phone: 858-736-1778 Recipient Principal Investigator: Kulinda Davis E-mail: kulinda.davis@sapphireenergy.com Phone: 858-736-1778 ASAP: NO Extent Competed: COMPETED Davis-Bacon Act: YES Delivery Location Code: 03601 Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401-3393 Payment: OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831 Fund: 05794 Appr Year: 2009 Allottee: 31 Report Entity: 200835 Object Class: 41000 Program: 1004173 Project: 2004000 WFO: 0000000 Local Use: 0000000 TAS Agency: 89 TAS Account: 0331				

SPECIAL TERMS AND CONDITIONS

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SPECIAL TERMS AND CONDITIONS

1. CONDITIONAL AVAILABILITY OF FUNDS

a. Notwithstanding the obligation of funds shown on the Assistance Agreement Cover Page, the parties hereby agree that the availability of funds to the Awardee for payment of costs incurred by the Awardee is conditioned upon the Awardee's submission of a full application and any subsequently requested supplemental information, the Contracting Officer's review and approval of the Awardee's application and supplemental information, and completion of negotiations. No funds, therefore, shall be made available to the Awardee for payment, and DOE does not guarantee or assume any obligation to reimburse costs incurred by the Awardee during the negotiation process.

b. When the parties have completed negotiations of all terms and conditions for this award, the Contracting Officer will issue an amendment to this award making available the obligated amount for payment in accordance with the payment provisions contained in the Special Terms and Conditions. The Awardee may then receive payment for allowable costs incurred or recognize costs incurred toward cost share requirements, as applicable, in accordance with the negotiated payment provisions.

c. Failure by the Recipient to provide an application and any subsequently requested supplemental documentation which is acceptable to the Contracting Officer, or failure to complete negotiations will be deemed noncompliance pursuant to 10 CFR 600.24. Based on such noncompliance, the Contracting Officer may unilaterally terminate or suspend this award. In such case, the Awardee shall not be reimbursed for costs incurred at the Awardee's risk, as described in Paragraph a. above.

2. RESOLUTION OF CONFLICTING CONDITIONS

Any apparent inconsistency between Federal statutes and regulations and the terms and conditions contained in this award must be referred to the DOE Award Administrator for guidance.

3. AWARD AGREEMENT TERMS AND CONDITIONS

a. This award consists of the Assistance Agreement, plus the following:
   1) Special Terms and Conditions.
   2) Applicable program regulations.
   3) DOE Assistance Regulations, 10 CFR Part 600 at http://ecfr.gpoaccess.gov.
   4) If the award is for research and the award is for a university or non-profit, the Research Terms & Conditions and the DOE Agency Specific Requirements at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp apply.
   5) Application/proposal as approved by DOE.

6) National Policy Assurances to Be Incorporated as Award Terms in effect on date of award at http://management.energy.gov/business_doe/1374.htm.

b. When the parties have completed negotiations of all final special terms and conditions for this award, the Contracting Officer will issue an amendment and the following documents will be added to the award:
   1) Special Terms and Conditions.
   2) Attachments:

Attachment Number	Title
1.	Intellectual Property Provisions
2.	Statement of Project Objectives
3.	Federal Assistance Reporting Checklist and Instructions
4.	Budget Pages (SF 424A)

4. ELECTRONIC AUTHORIZATION OF AWARD DOCUMENTS

Acknowledgement of award documents by the Recipient's authorized representative through electronic systems used by the Department of Energy, specifically FedConnect, constitutes the Recipient's acceptance of the terms and conditions of the award. Acknowledgement via FedConnect by the Recipient's authorized representative constitutes the Recipient's electronic signature.

5. AWARD PROJECT PERIOD

The Project Period for this award is shown in the Assistance Agreement, Block 7, Period of Performance. The Project Period may be amended upon completion of negotiations.

6. INTELLECTUAL PROPERTY PROVISIONS

The intellectual property provisions applicable to this award will be incorporated by reference or included as Attachment 1 to the amended award, upon completion of negotiations.

7. COST SHARE

a. The Federal funds currently obligated on this award are shown in the Assistance Agreement, Blocks 12 and 13. The Federal funds and Recipient cost share may be amended upon completion of negotiations.

b. Total Estimated Project Cost is the sum of the Federal Government share and Recipient share of the estimated project costs. The Recipient's cost share must come from non-Federal sources unless otherwise allowed by law. By accepting Federal funds under this award, you agree that you are liable for your percentage share of total allowable project

costs, on a budget period basis, even if the project is terminated early or is not funded to its completion.

c. If you discover that you may be unable to provide cost sharing that is required upon completion of negotiations, the Recipient should immediately provide written notification to the DOE Award Administrator, indicating whether the Recipient will continue or phase out the project. If the Recipient plans to continue the project, the notification must describe how replacement cost sharing will be secured.

d. The Recipient must maintain records of all project costs that you claim as cost sharing, including in-kind costs, as well as records of costs to be paid by DOE. Such records are subject to audit.

e. Failure to provide the cost sharing required by this Article may result in the subsequent recovery by DOE of some or all the funds provided under the award.

8. REPORTING REQUIREMENTS

a. Requirements. The reporting requirements for this award will be identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, and become Attachment 3 to an amended award upon completion of negotiations. (A sample checklist may be found at the following link: http://www.management.energy.gov/documents/DOEF46002PolicyVersion.pdf.)

Failure to comply with the reporting requirements will be considered a material noncompliance with the terms of the award. Noncompliance may result in withholding of future payments, suspension or termination of the current award, and withholding of future awards. A willful failure to perform, a history of failure to perform, or unsatisfactory performance of this and/or other financial assistance awards, may also result in a debarment action to preclude future awards by Federal agencies.

b. Dissemination of scientific/technical reports. Scientific/technical reports submitted under this award will be disseminated on the Internet via the DOE Information Bridge (www.osti.gov/bridge), unless the report contains patentable material, protected data or SBIR/STTR data. Citations for journal articles produced under the award will appear on the DOE Energy Citations Database (www.osti.gov/energycitations).

c. Restrictions. Reports submitted to the DOE Information Bridge must not contain any Protected Personal Identifiable Information (PII), limited rights data (proprietary data), classified information, information subject to export control classification, or other information not subject to release.

9. PAYMENT PROCEDURES

a. Method of Payment. Payment will be made by reimbursement through the Automated Clearinghouse (ACH) method of payment.

b. Requesting Reimbursement. Requests for reimbursements must be made electronically through Department of Energy's Oak Ridge Financial Service Center (ORFSC) ACH Vendor Inquiry Payment Electronic Reporting System (VIPERS). To access and use VIPERS, you must enroll at https://finweb.oro.doe.gov/vipers.htm. Detailed instructions on how to enroll are provided on the web site.

For non-construction awards, you must submit a Standard Form (SF) 270, "Request for Advance or Reimbursement," at https://finweb.oro.doe.gov/vipers.htm and attach a file containing appropriate supporting documentation. The file attachment must show the total Federal share claimed on the SF 270, the non-Federal share claimed for the billing period if cost sharing is required, and cumulative expenditures to date (both Federal and non-Federal) for each of the following categories: salaries/wages and fringe benefits; equipment; travel; participant/training support costs, if any; other direct costs, including subawards/contracts; and indirect costs. For construction awards, you must submit a SF 271, "Outlay Report and Request for Reimbursement for Construction Programs," through VIPERS.

c. Timing of submittals. Submittal of the SF 270 or SF 271 should coincide with your normal billing pattern, but not more frequently than every two weeks. Requests for reimbursement must be limited to the amount of disbursements made during the billing period for the Federal share of direct project costs and the proportionate share of any allowable indirect costs incurred during that billing period.

d. Adjusting payment requests for available cash. You must disburse any funds that are available from repayments to and interest earned on a revolving fund, program income, rebates, refunds, contract settlements, audit recoveries, credits, discounts, and interest earned on any of those funds before requesting additional cash payments from DOE.

e. Payments. The DOE approving official will approve the invoice as soon as practical, but not later than 30 days after your request is received, unless the billing is improper. Upon receipt of an invoice payment authorization from the DOE approving official, the ORFSC will disburse payment to you. You may check the status of payments at the VIPER web site. All payments are made by electronic funds transfer to the bank account identified on the ACH Vendor/Miscellaneous Payment Enrollment Form (SF 3881) that you filed.

10. REBUDGETING AND RECOVERY OF INDIRECT COSTS

a. If actual allowable indirect costs are less than those budgeted and funded under the award, the Awardee may use the difference to pay additional allowable direct costs during the project period. If at the completion of the award the Government's share of total allowable costs (i.e., direct and indirect), is less than the total costs reimbursed, the Awardee must refund the difference.

b. Awardees are expected to manage their indirect costs. DOE will not amend an award solely to provide additional funds for changes in indirect cost rates. DOE recognizes that the inability to obtain full reimbursement for indirect costs means the Awardee must absorb the underrecovery. Such underrecovery may be allocated as part of the organization's required cost sharing**.**

11. INSOLVENCY, BANKRUPTCY OR RECEIVERSHIP

a. The Awardee shall immediately notify the DOE Administrator identified on the Assistance Agreement Cover Page of the occurrence of any of the following events: (i) the Awardee, or the Awardee's parent's filing of a voluntary case seeking liquidation or reorganization under the Bankruptcy Act; (ii) the Awardee's consent to the institution of an involuntary case under the Bankruptcy Act against the Awardee or its parent; (iii) the filing of any similar proceeding for or against the Awardee or its parent, or its consent to, the dissolution, winding-up or readjustment of its debts, appointment of a receiver, conservator, trustee, or other officer with similar powers over the Awardee, under any other applicable state or federal law; or (iv) the Awardee's insolvency due to its inability to pay its debts generally as they become due.

b. Such notification shall be in writing and shall: (i) specifically set out the details of the occurrence of an event referenced in paragraph (a); (ii) provide the facts surrounding that event; and (iii) provide the impact such event will have on the project being funded by this award.

c. Upon the occurrence of any of the four events described in the first paragraph, DOE reserves the right to conduct a review of the award to determine the Awardee's compliance with the required elements of the award (including such items as cost share, progress towards technical project objectives, and submission of required reports). If a DOE review determines that there are significant deficiencies or concerns with the Awardee's performance under the award, DOE reserves the right to impose additional requirements, as needed, including (i) change the Awardee payment method; or (ii) institute payment controls.

d. Failure of the Awardee to comply with this provision may be considered by the Contracting Officer to be a material noncompliance of this financial assistance award.

12. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) REQUIREMENTS

The Awardee and any of its subawardees are restricted from taking any action using Federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE providing either a NEPA clearance or a final NEPA decision regarding this project. If the Awardee moves forward with activities that are not authorized by the Contracting Officer for federal funding by the DOE under this award, in advance of negotiations, to include DOE initiating the NEPA process, the Awardee is doing so at risk of deobligation of federal funding and such costs may not be recognized as allowable cost share.

If this award includes construction activities, the Awardee must submit an environmental evaluation report/evaluation notification form addressing NEPA issues prior to DOE initiating the NEPA process.

13. STATEMENT OF FEDERAL STEWARDSHIP

DOE will exercise normal Federal stewardship in overseeing the project activities performed under this award. Stewardship activities include, but are not limited to, conducting site visits; reviewing performance and financial reports; providing technical assistance and/or temporary intervention in unusual circumstances to correct deficiencies which develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the award objectives have been accomplished.

14. SITE VISITS

DOE's authorized representatives have the right to make site visits at reasonable times to review project accomplishments and management control systems and to provide technical assistance, if required. The Awardee must provide, and must require its subawardees to provide, reasonable access to facilities, office space, resources, and assistance for the safety and convenience of the DOE and any other government representatives in the performance of their duties. All site visits and evaluations will be performed in a manner that does not unduly interfere with or delay the work.

15. PUBLICATIONS

a. The Awardee is encouraged to publish or otherwise make publicly available the results of the work conducted under the award.

b. An acknowledgment of Federal support and a disclaimer must appear in the publication of any material, whether copyrighted or not, based on or developed under this project, as follows:

Acknowledgment: "This material is based upon work supported by the Department of Energy [National Nuclear Security Administration] [add name(s) of other agencies, if applicable] under Award Number(s) [enter the award number(s)]."

Disclaimer: "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."

16. FEDERAL, STATE, AND MUNICIPAL REQUIREMENTS

The Awardee must obtain any required permits and comply with applicable federal, state, and municipal laws, codes, and regulations for work performed under this award.

17. LOBBYING RESTRICTIONS

By accepting funds under this award, the Awardee agrees that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

18. NOTICE REGARDING THE PURCHASE OF AMERICAN-MADE EQUIPMENT AND PRODUCTS -- SENSE OF CONGRESS

It is the sense of the Congress that, to the greatest extent practicable, all equipment and products purchased with funds made available under this award should be American-made.

19. SPECIAL PROVISIONS RELATING TO WORK FUNDED UNDER AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (May 2009)

Preamble

The American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, (Recovery Act) was enacted to preserve and create jobs and promote economic recovery, assist those most impacted by the recession, provide investments needed to increase economic efficiency by spurring technological advances in science and health, invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits, stabilize State and local government budgets, in order to minimize and avoid reductions in essential services and counterproductive State and local tax increases. Recipients shall use grant funds in a manner that maximizes job creation and economic benefit.

The Recipient shall comply with all terms and conditions in the Recovery Act relating generally to governance, accountability, transparency, data collection and resources as specified in Act itself and as discussed below.

Recipients should begin planning activities for their first tier subrecipients, including obtaining a DUNS number (or updating the existing DUNS record), and registering with the Central Contractor Registration (CCR).

Be advised that Recovery Act funds can be used in conjunction with other funding as necessary to complete projects, but tracking and reporting must be separate to meet the reporting requirements of the Recovery Act and related guidance. For projects funded by sources other than the Recovery Act, Contractors must keep separate records for Recovery Act funds and to ensure those records comply with the requirements of the Act.

The Government has not fully developed the implementing instructions of the Recovery Act, particularly concerning specific procedural requirements for the new reporting requirements. The Recipient will be provided these details as they become available. The Recipient must comply with all requirements of the Act. If the recipient believes there is any inconsistency between ARRA requirements and current award terms and conditions, the issues will be referred to the Contracting Officer for reconciliation.

Definitions

For purposes of this clause, Covered Funds means funds expended or obligated from appropriations under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5. Covered Funds will have special accounting codes and will be identified as Recovery Act funds in the grant, cooperative agreement or TIA and/or modification using Recovery Act funds. Covered Funds must be reimbursed by September 30, 2015.

Non-Federal employer means any employer with respect to covered funds -- the contractor, subcontractor, grantee, or recipient, as the case may be, if the contractor, subcontractor, grantee, or recipient is an employer; and any professional membership organization, certification of other professional body, any agent or licensee of the Federal government, or any person acting directly

or indirectly in the interest of an employer receiving covered funds; or with respect to covered funds received by a State or local government, the State or local government receiving the funds and any contractor or subcontractor receiving the funds and any contractor or subcontractor of the State or local government; and does not mean any department, agency, or other entity of the federal government.

Recipient means any entity that receives Recovery Act funds directly from the Federal government (including Recovery Act funds received through grant, loan, or contract) other than an individual and includes a State that receives Recovery Act Funds.

Special Provisions

A. Flow Down Requirement

Recipients must include these special terms and conditions in any subaward.

B. Segregation of Costs

Recipients must segregate the obligations and expenditures related to funding under the Recovery Act. Financial and accounting systems should be revised as necessary to segregate, track and maintain these funds apart and separate from other revenue streams. No part of the funds from the Recovery Act shall be commingled with any other funds or used for a purpose other than that of making payments for costs allowable for Recovery Act projects.

C. Prohibition on Use of Funds

None of the funds provided under this agreement derived from the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, may be used by any State or local government, or any private entity, for any casino or other gambling establishment, aquarium, zoo, golf course, or swimming pool.

D. Access to Records

With respect to each financial assistance agreement awarded utilizing at least some of the funds appropriated or otherwise made available by the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, any representative of an appropriate inspector general appointed under section 3 or 8G of the Inspector General Act of 1988 (5 U.S.C. App.) or of the Comptroller General is authorized --

(1) to examine any records of the contractor or grantee, any of its subcontractors or subgrantees, or any State or local agency administering such contract that pertain to, and involve transactions that relate to, the subcontract, subcontract, grant, or subgrant; and

(2) to interview any officer or employee of the contractor, grantee, subgrantee, or agency regarding such transactions.

E. Publication

An application may contain technical data and other data, including trade secrets and/or privileged or confidential information, which the applicant does not want disclosed to the public or used by the Government for any purpose other than the application. To protect such data, the applicant should specifically identify each page including each line or paragraph thereof containing the data to be protected and mark the cover sheet of the application with the following Notice as well as referring to the Notice on each page to which the Notice applies:

Notice of Restriction on Disclosure and Use of Data
The data contained in pages ---- of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data here to the extent provided in the award. This restriction does not limit the Government's right to use or disclose data obtained without restriction from any source, including the applicant.

Information about this agreement will be published on the Internet and linked to the website www.recovery.gov, maintained by the Accountability and Transparency Board. The Board may exclude posting contractual or other information on the website on a case-by-case basis when necessary to protect national security or to protect information that is not subject to disclosure under sections 552 and 552a of title 5, United States Code.

F. Protecting State and Local Government and Contractor Whistleblowers.

The requirements of Section 1553 of the Act are summarized below. They include, but are not limited to:

Prohibition on Reprisals: An employee of any non-Federal employer receiving covered funds under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, may not be discharged, demoted, or otherwise discriminated against as a reprisal for disclosing, including a disclosure made in the ordinary course of an employee's duties, to the Accountability and Transparency Board, an inspector general, the Comptroller General, a member of Congress, a State or Federal regulatory or law enforcement agency, a person with supervisory authority over the employee (or other person working for the employer who has the authority to investigate, discover or terminate misconduct), a court or grant jury, the head of a Federal agency, or their representatives information that the employee believes is evidence of:

- gross management of an agency contract or grant relating to covered funds;
- a gross waste of covered funds;
- a substantial and specific danger to public health or safety related to the implementation or use of covered funds;
- an abuse of authority related to the implementation or use of covered funds; or
- as violation of law, rule, or regulation related to an agency contract (including the competition for or negotiation of a contract) or grant, awarded or issued relating to covered funds.

Agency Action: Not later than 30 days after receiving an inspector general report of an alleged reprisal, the head of the agency shall determine whether there is sufficient basis to conclude that the non-Federal employer has subjected the employee to a prohibited reprisal. The agency shall either issue an order denying relief in whole or in part or shall take one or more of the following actions:

- Order the employer to take affirmative action to abate the reprisal.
- Order the employer to reinstate the person to the position that the person held before the reprisal, together with compensation including back pay, compensatory damages, employment benefits, and other terms and conditions of employment that would apply to the person in that position if the reprisal had not been taken.
- Order the employer to pay the employee an amount equal to the aggregate amount of all costs and expenses (including attorneys' fees and expert witnesses' fees) that were reasonably incurred by the employee for or in connection with, bringing the complaint regarding the reprisal, as determined by the head of a court of competent jurisdiction.

Nonenforceablity of Certain Provisions Waiving Rights and remedies or Requiring Arbitration: Except as provided in a collective bargaining agreement, the rights and remedies provided to aggrieved employees by this section may not be waived by any agreement, policy, form, or condition of employment, including any predispute arbitration agreement. No predispute arbitration agreement shall be valid or enforceable if it requires arbitration of a dispute arising out of this section.

Requirement to Post Notice of Rights and Remedies: Any employer receiving covered funds under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, shall post notice of the rights and remedies as required therein. (Refer to section 1553 of the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, www.Recovery.gov, for specific requirements of this section and prescribed language for the notices.).

G. Reserved.

H. False Claims Act

Recipient and sub-recipients shall promptly refer to the DOE or other appropriate Inspector General any credible evidence that a principal, employee, agent, contractor, sub-grantee, subcontractor or other person has submitted a false claim under the False Claims Act or has committed a criminal or civil violation of laws pertaining to fraud, conflict of interest, bribery, gratuity or similar misconduct involving those funds.

I. Information in Support of Recovery Act Reporting

Recipient may be required to submit backup documentation for expenditures of funds under the Recovery Act including such items as timecards and invoices. Recipient shall provide copies of backup documentation at the request of the Contracting Officer or designee.

J. Availability of Funds

Funds appropriated under the Recovery Act and obligated to this award are available for reimbursement of costs until September 30, 2015.

K. Additional Funding Distribution and Assurance of Appropriate Use of Funds

If the Recipient is a State Government, the following paragraphs apply:

Certification by Governor -- Not later than April 3, 2009, for funds provided to any State or agency thereof by the American Reinvestment and Recovery Act of 2009, Pub. L. 111-5, the Governor of the State shall certify that: 1) the state will request and use funds provided by the Act; and 2) the funds will be used to create jobs and promote economic growth.

Acceptance by State Legislature -- If funds provided to any State in any division of the Act are not accepted for use by the Governor, then acceptance by the State legislature, by means of the adoption of a concurrent resolution, shall be sufficient to provide funding to such State.

Distribution -- After adoption of a State legislature's concurrent resolution, funding to the State will be for distribution to local governments, councils of government, public entities, and public-private entities within the State either by formula or at the State's discretion.

L. Certifications

With respect to funds made available to State or local governments for infrastructure investments under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, the Governor, mayor, or other chief executive, as appropriate, certified by acceptance of this award that the infrastructure investment has received the full review and vetting required by law and that the chief executive accepts responsibility that the infrastructure investment is an appropriate use of taxpayer dollars. Recipient shall provide an additional certification that includes a description of the investment, the estimated total cost, and the amount of covered funds to be used for posting on the Internet. A State or local agency may not receive infrastructure investment funding from funds made available by the Act unless this certification is made and posted.

20. REPORTING AND REGISTRATION REQUIREMENTS UNDER SECTION 1512 OF THE RECOVERY ACT

(a) This award requires the recipient to complete projects or activities which are funded under the American Recovery and Reinvestment Act of 2009 (Recovery Act) and to report on use of Recovery Act funds provided through this award. Information from these reports will be made available to the public.

(b) The reports are due no later than ten calendar days after each calendar quarter in which the Recipient receives the assistance award funded in whole or in part by the Recovery Act.

(c) Recipients and their first-tier subrecipients must maintain current registrations in the Central Contractor Registration (*http://www.ccr.gov*) at all times during which they have active federal awards funded with Recovery Act funds. A Dun and Bradstreet Data Universal Numbering System (DUNS) Number (*http://www.dnb.com*) is one of the requirements for registration in the Central Contractor Registration.

(d) The recipient shall report the information described in section 1512(c) of the Recovery Act using the reporting instructions and data elements that will be provided online at *http://www.FederalReporting.gov* and ensure that any information that is pre-filled is corrected or updated as needed.

21. REQUIRED USE OF AMERICAN IRON, STEEL, AND MANUFACTURED GOODS – SECTION 1605 OF THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009

After completion of negotiations, this provision may be revised.

(a) *Definitions.* As used in this award term and condition—

(1) *Manufactured good* means a good brought to the construction site for incorporation into the building or work that has been—

(i) Processed into a specific form and shape; or

(ii) Combined with other raw material to create a material that has different properties than the properties of the individual raw materials.

(2) *Public building and public work* means a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.

(3) *Steel* means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

(b) *Domestic preference.* (1) This award term and condition implements Section 1605 of the American Recovery and Reinvestment Act of 2009 (Recovery Act) (Pub. L. 111–5), by requiring that all iron, steel, and manufactured goods used in the project are produced in the United States except as provided in paragraph (b)(3) of this section and condition.

(2) This requirement does not apply to the material listed by the Federal Government as follows:

None.

(3) The award official may add other iron, steel, and/or manufactured goods to the list in paragraph (b)(2) of this section and condition if the Federal Government determines that—

(i) The cost of the domestic iron, steel, and/or manufactured goods would be unreasonable. The cost of domestic iron, steel, or manufactured goods used in the project is unreasonable when the cumulative cost of such material will increase the cost of the overall project by more than 25 percent;

(ii) The iron, steel, and/or manufactured good is not produced, or manufactured in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(iii) The application of the restriction of section 1605 of the Recovery Act would be inconsistent with the public interest.

(c) *Request for determination of inapplicability of Section 1605 of the Recovery Act* . (1)(i) Any recipient request to use foreign iron, steel, and/or manufactured goods in accordance with paragraph (b)(3) of this section shall include adequate information for Federal Government evaluation of the request, including—

(A) A description of the foreign and domestic iron, steel, and/or manufactured goods;

(B) Unit of measure;

(C) Quantity;

(D) Cost;

(E) Time of delivery or availability;

(F) Location of the project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign iron, steel, and/or manufactured goods cited in accordance with paragraph (b)(3) of this section.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed cost comparison table in the format in paragraph (d) of this section.

(iii) The cost of iron, steel, and/or manufactured goods material shall include all delivery costs to the construction site and any applicable duty.

(iv) Any recipient request for a determination submitted after Recovery Act funds have been obligated for a project for construction, alteration, maintenance, or repair shall explain why the recipient could not reasonably foresee the need for such determination and could not have requested the determination before the funds were obligated. If the recipient does not submit a satisfactory explanation, the award official need not make a determination.

(2) If the Federal Government determines after funds have been obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official will amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is the unreasonable cost of the domestic iron, steel, or manufactured goods, the award official shall adjust the award amount or redistribute budgeted funds by at least the differential established in 2 CFR 176.110(a).

(3) Unless the Federal Government determines that an exception to section 1605 of the Recovery Act applies, use of foreign iron, steel, and/or manufactured goods is noncompliant with section 1605 of the American Recovery and Reinvestment Act.

(d) *Data.* To permit evaluation of requests under paragraph (b) of this section based on unreasonable cost, the Recipient shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Items Cost Comparison

Description	Unit of measure	Quantity	Cost (dollars)*
Item 1:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____
Item 2:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____

List name, address, telephone number, email address, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.

Include other applicable supporting information.

*Include all delivery costs to the construction site.

22. RECOVERY ACT TRANSACTIONS LISTED IN SCHEDULE OF EXPENDITURES OF FEDERAL AWARDS AND RECIPIENT RESPONSIBILITIES FOR INFORMING SUBRECIPIENTS

(a) To maximize the transparency and accountability of funds authorized under the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5) (Recovery Act) as required by Congress and in accordance with 2 CFR 215.21 "Uniform Administrative Requirements for Grants and Agreements" and OMB Circular A–102 Common Rules provisions, recipients agree to maintain records that identify adequately the source and application of Recovery Act funds. OMB Circular A–102 is available at *http://www.whitehouse.gov/omb/circulars/a102/a102.html.*

(b) For recipients covered by the Single Audit Act Amendments of 1996 and OMB Circular A–133, "Audits of States, Local Governments, and Non-Profit Organizations," recipients agree to separately identify the expenditures for Federal awards under the Recovery Act on the Schedule of Expenditures of Federal Awards (SEFA) and the Data Collection Form (SF–SAC) required by OMB Circular A–133. OMB Circular A–133 is available at *http://www.whitehouse.gov/omb/circulars/a133/a133.html.* This shall be accomplished by identifying expenditures for Federal awards made under the Recovery Act separately on the SEFA, and as separate rows under Item 9 of Part III on the SF–SAC by CFDA number, and inclusion of the prefix "ARRA-" in identifying the name of the Federal program on the SEFA and as the first characters in Item 9d of Part III on the SF–SAC.

(c) Recipients agree to separately identify to each subrecipient, and document at the time of subaward and at the time of disbursement of funds, the Federal award number, CFDA number, and amount of Recovery Act funds. When a recipient awards Recovery Act funds for an existing program, the information furnished to subrecipients shall distinguish the subawards of incremental Recovery Act funds from regular subawards under the existing program.

(d) Recipients agree to require their subrecipients to include on their SEFA information to specifically identify Recovery Act funding similar to the requirements for the recipient SEFA described above. This information is needed to allow the recipient to properly monitor subrecipient expenditure of ARRA funds as well as oversight by the Federal awarding agencies, Offices of Inspector General and the Government Accountability Office.

23. WAGE RATE REQUIREMENTS UNDER SECTION 1606 OF THE RECOVERY ACT

After completion of negotiations, this provision may be revised.

(a) Section 1606 of the Recovery Act requires that all laborers and mechanics employed by contractors and subcontractors on projects funded directly by or assisted in whole or in part

by and through the Federal Government pursuant to the Recovery Act shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code.

Pursuant to Reorganization Plan No. 14 and the Copeland Act, 40 U.S.C. 3145, the Department of Labor has issued regulations at 29 CFR parts 1, 3, and 5 to implement the Davis-Bacon and related Acts. Regulations in 29 CFR 5.5 instruct agencies concerning application of the standard Davis-Bacon contract clauses set forth in that section. Federal agencies providing grants, cooperative agreements, and loans under the Recovery Act shall ensure that the standard Davis-Bacon contract clauses found in 29 CFR 5.5(a) are incorporated in any resultant covered contracts that are in excess of $2,000 for construction, alteration or repair (including painting and decorating).

(b) For additional guidance on the wage rate requirements of section 1606, contact your awarding agency. Recipients of grants, cooperative agreements and loans should direct their initial inquiries concerning the application of Davis-Bacon requirements to a particular federally assisted project to the Federal agency funding the project. The Secretary of Labor retains final coverage authority under Reorganization Plan Number 14.

24. DAVIS BACON ACT AND CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

After completion of negotiations, this provision may be revised.

Definitions: For purposes of this provision, "Davis Bacon Act and Contract Work Hours and Safety Standards Act," the following definitions are applicable:

(1) "Award" means any grant, cooperative agreement or technology investment agreement made with Recovery Act funds by the Department of Energy (DOE) to a Recipient. Such Award must require compliance with the labor standards clauses and wage rate requirements of the Davis-Bacon Act (DBA) for work performed by all laborers and mechanics employed by Recipients (other than a unit of State or local government whose own employees perform the construction) Subrecipients, Contractors, and subcontractors.

(2) "Contractor" means an entity that enters into a Contract. For purposes of these clauses, Contractor shall include (as applicable) prime contractors, Recipients, Subrecipients, and Recipients' or Subrecipients' contractors, subcontractors, and lower-tier subcontractors. "Contractor" does not mean a unit of State or local government where construction is performed by its own employees."

(3) "Contract" means a contract executed by a Recipient, Subrecipient, prime contractor, or any tier subcontractor for construction, alteration, or repair. It may also mean (as applicable) (i) financial assistance instruments such as grants, cooperative

agreements, technology investment agreements, and loans; and, (ii) Sub awards, contracts and subcontracts issued under financial assistance agreements. “Contract” does not mean a financial assistance instrument with a unit of State or local government where construction is performed by its own employees.

(4) “Contracting Officer” means the DOE official authorized to execute an Award on behalf of DOE and who is responsible for the business management and non-program aspects of the financial assistance process.

(5) “Recipient” means any entity other than an individual that receives an Award of Federal funds in the form of a grant, cooperative agreement, or technology investment agreement directly from the Federal Government and is financially accountable for the use of any DOE funds or property, and is legally responsible for carrying out the terms and conditions of the program and Award.

(6) “Subaward” means an award of financial assistance in the form of money, or property in lieu of money, made under an award by a Recipient to an eligible Subrecipient or by a Subrecipient to a lower-tier subrecipient. The term includes financial assistance when provided by any legal agreement, even if the agreement is called a contract, but does not include the Recipient’s procurement of goods and services to carry out the program nor does it include any form of assistance which is excluded from the definition of “Award” above.

(7) “Subrecipient” means a non-Federal entity that expends Federal funds received from a Recipient to carry out a Federal program, but does not include an individual that is a beneficiary of such a program.

(a) Davis Bacon Act

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and, without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions

of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, *provided* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The Contracting Officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the Contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the Contracting Officer do not

agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *provided* that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The Department of Energy or the Recipient or Subrecipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the Contract, the Department of Energy, Recipient, or Subrecipient, may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii) (A) The Contractor shall submit weekly for each week in which any Contract work is performed a copy of all payrolls to the Department of Energy if the agency is a party to the Contract, but if the agency is not such a party, the Contractor will submit the payrolls to the Recipient or Subrecipient (as applicable), applicant, sponsor, or owner, as the case may be, for transmission to the Department of Energy. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime Contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Department of Energy if the agency is a party to the Contract, but if the agency is not such a party, the Contractor will submit them to the Recipient or Subrecipient (as applicable), applicant, sponsor, or owner, as the case may be, for transmission to the Department of

Energy, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the Recipient or Subrecipient (as applicable), applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 3729 of title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Department of Energy or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency

may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees—

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this Contract.

(6) Contracts and Subcontracts. The Recipient, Subrecipient, the Recipient’s, and Subrecipient’s contractors and subcontractor shall insert in any Contracts the clauses contained herein in(a)(1) through (10) and such other clauses as the Department of Energy may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Recipient shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of the paragraphs in this clause.

(7) Contract termination: debarment. A breach of the Contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this Contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Recipient, Subrecipient, the Contractor (or any of its subcontractors), and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No Contractor or subcontractor contracting for any part of the Contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with

respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The Department of Energy or the Recipient or Subrecipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Contracts and Subcontracts. The Recipient, Subrecipient, and Recipient's and Subrecipient's contractor or subcontractor shall insert in any Contracts, the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Recipient shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(5) The Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the Contract for all laborers and mechanics, including guards and watchmen, working on the Contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. The records to be maintained under this paragraph shall be made available by the Contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Department of Energy and the Department of Labor, and the Contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

(d) Rates of Wages

After completion of negotiations, this provision may be revised.

The minimum wages to be paid laborers and mechanics under this award involved in performance of work at the project site, as determined by the Secretary of Labor to be prevailing for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the pertinent locality, are found at http://www.wdol.gov/, by clicking on "Selecting DBA WDs". The Wage Determination Number(s) and General Decision

Number(s) specific to this award are found below. These wage rates are minimum rates and are not intended to represent the actual wage rates that the Contractor may have to pay.

CONSTRUCTION TYPE	WAGE DETERMINATION NUMBER	GENERAL DECISION NUMBER
Building	TBD	TBD
Highway	TBD	TBD
Residential	TBD	TBD

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(01-99) All Other Editions Are Obsolete

U.S. Department of Energy

Office of Congressional and Intergovernmental Affairs (CI)

CONGRESSIONAL GRANT/CONTRACT NOTIFICATION

TO: Office of Congressional & Intergovernmental Affairs
ATTN: Contract Notification Coordinator (CI-40)
U.S. Department of Energy
1000 Independence Avenue, SW Room 8G-070
Washington, DC 20585

Telephone: 202-586-2764
Fax: 202-586-5497

1. Informing Office: Golden Field Office (GFO)
Name: Melissa Wise
(Contracting Office Representative)
Phone: 303-275-4907

2. Program Office/Project Office:
Name: Fred Gerdeman
Phone: 303-275-4928

3. Contractor, Grantee or Offeror:
Name: Sapphire Energy, Inc.
Street: 3115 Merryfield Row
City: San Diego State: CA Zip: 92121-1125

4. Place of Performance: (Required if different from #3)
Street:
City: Columbus State: NM Zip: 88029

5. Proposed date of award: No later than 09/30/2010
Date of Public Announcement: 12/04/2009 (if any)

6. Contract, Grant, or Other Agreement No.:
DE-EE0002884
(Specify Type of Instrument)
☒ New ☐ Renewal
☐ Modification – Total to date: $

7. Obligated Cost or Price of this Action: $50,000,000
Estimated Cost or Price of Total Contract: $Redacted
Recipient Cost Sharing (if applicable): $Exemption 4
(For incrementally funded contracts only. Report the Initial obligation and total estimated contract value.)

Does this award result from an Invitation for Bid?
☐ Yes ☒ No

8. Duration of Contract, Grant, or Other Agreement:
From: 01/04/2010 To: 09/30/2014

9. Brief Description. (Please use non-technical/plain English language/no acronyms.)
This project will demonstrate an integrated algal biorefinery process that will cultivate algae in ponds, and will use dewatering and oil extraction technology to produce an intermediate that will then be processed by Dynamic Fuels into drop-in green fuels such as jet fuel and diesel.

TO BE COMPLETED BY OFFICIAL RESPONSIBLE FOR SUBMISSION

10. Method of Submission:
☒ PDF, Upload

Date: DEC 03 2009 Time: 4:02 NM

Name: Molly Hames
Title: Grants and Agreements Specialist
Signature: Molly R Hames
Office: Golden Field Office

December 4, 2009

Ms. Kulinda Davis
Sapphire Energy, Inc
3115 Merryfield Row
San Diego, CA 92121-1125

Dear Ms. Kulinda Davis:

SUBJECT: Biomass Funding Opportunity Announcement DE-FOA-0000096, Recovery Act - Demonstration of Integrated Biorefinery Operations

Evaluation of your application received in response to the subject Funding Opportunity Announcement has been completed. After a careful review, I am pleased to inform you that your application has been selected for negotiations leading to an award.

In order to expedite the negotiation process, further information is needed to clarify and supplement your application. Please submit the following information to Molly Hames, Specialist, by January 4, 2010, if the information was not previously provided, or if any information has changed.

1. Complete each of the following required forms, which are available on the Project Management Center website at https://www.eere-pmc.energy.gov/Forms.aspx

    a. Application for Federal Assistance, SF 424;
    b. Budget Information – Non Construction Programs, SF 424A or SF 424 (R&R);
    c. Financial Assistance Pre-Award Information Sheet, PMC 121.1
    NOTE: Complete the PMC 121.1 form first and promptly email it under separate cover to me at the email address listed below;
    d. Financial Information, PMC 410.1;
    e. Representation of Limited Rights Data and Restricted Computer Software;
    f. Environmental Checklist, EF1. (This form should be completed on line at https://www.eere-pmc.energy.gov/nepa.asp)
    g. Statement of Project Objectives;
    h. Commitment Letters from Third Parties Contributing to Cost Sharing;
    i. Copy of your approved Indirect Rate Agreement or a Rate Proposal, following the guidelines in the PMC 400.2 form.

During fiscal year 2008, this office will implement a new electronic, paperless procurement system called STRIPES. Upon implementation of STRIPES, ALL organizations currently doing or wanting to do business with this office MUST BE registered with the Central Contractor Registration (CCR) and with FedConnect. As a result, it is imperative that you read and react to information provided in the document entitled "CCR and FedConnect Registrations" on the above referenced PMC website.

The Financial Assistance Regulations, found at https://www.eere-pmc.energy.gov/forms.aspx , and the OMB Circulars, found at http://www.whitehouse.gov/OMB/circulars/index.html will assist you in understanding your requirements as an award Recipient

You may incur pre-award costs 90 calendar days prior to award without prior approval or more than 90 calendar days with the prior approval of DOE. All pre-award costs are incurred at your risk (i.e., DOE is under no obligation to reimburse such costs if for any reason you do not receive an award or if the award is less than anticipated and inadequate to cover such costs). All costs must be allowable in accordance with the applicable cost principles.

If you will be unable to provide the information by the date requested or have any questions concerning the requested information, please contact Molly Hames, at 303-275-4864, molly.hames@go.doe.gov.

All projects receiving financial assistance from DOE must be reviewed under NEPA, for potential environmental impacts of the project. Funding for an award is contingent upon successfully completing the negotiations and obtaining the NEPA determination. You are restricted from taking any action using federal funds or your cost share funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE providing either a NEPA clearance or a final NEPA decision regarding the project.

If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

This letter constitutes your debriefing for this Funding Opportunity Announcement.

On behalf of the Department of Energy, I would like to express a sincere appreciation of your interest and participation in developing the US bioindustry and look forward to initiating this worthwhile project.

Sincerely,

Fred Gerdeman

Fred Gerdeman
Merit Review Committee Chairperson

Applicant Name: Sapphire Energy / AMEC 2010 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$3,291,081		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income	$0				$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$3,291,081	$0	$135,450	$77,236	$3,078,396
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	Redacted Exemption 4			
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$34,540,380	$125,000	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / AMEC 2011 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$34,540,380		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 2nd Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$34,540,380	$10,706,463	$12,955,624	$9,927,471	$950,822
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	Redacted Exemption 4			
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$125,000	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / AMEC 2012 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$125,000		

Redacted Exemption 4

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					$0

Redacted Exemption 4

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 3rd Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$125,000	$89,205	$35,796	$0	$0
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / AMEC 2013 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner				$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / AMEC 2014 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital						$0
3. Operating Expense						$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)	$0	$0		$0	$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner				$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0	$0	$0	$0	$0
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / AMEC Cummulative Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$37,956,461		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income			$0		$0

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Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction		Redacted Exemption 4			
9. IABR Working Capital					
10. Operating Expense					
11. R&D Partner					
12. Total (sum of lines 8 - 11)					

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction				
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Instructions and Summary

Award Number: DE-FOA-000096
Award Recipient: Sapphire / AMEC

Date of Submission: 6/30/2009
Form submitted by: Sapphire Energy
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel						
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
1. Generation 2A Receiver Design		**10000**		**$423,000**	**600**		**$24,000**	**800**		**$31,000**	**11400**	**$478,000**	**Actual Salary**
EXAMPLE	Sr. Engineer	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50.00	$10,000	**2400**	**$190,000**	Actual Salary
ONLY!!!	Electrical engineers	6200	$35.00	$217,000	400	$35.00	$14,000	600	$35.00	$21,000	**7200**	**$252,000**	Actual Salary
	Technician	1800	$20.00	$36,000	0	$0.00	$0	0	$0.00	$0	**1800**	**$36,000**	Actual Salary

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total fringe requested:	$0	$0	$0	**$0**

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information, if it has not already been provided to the Contracting Officer, OR if it has changed since it was. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the appliction of the approved rate, to arrive at the proposed fringes benefits dollars should also be provided.)

____ **There is not a current, federally approved rate agreement negotiated and available.**
(When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional explanation/comments (as necessary)

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement	2			2	$650	$1,300	Internet prices

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Thermal shock chamber	2	$20,000	$40,000	Vendor Quote	Reliability testing of PV modules- Task 4.3
			$0		
			$0		
Budget Period 1 Total			$0		
Budget Period 2					
			$0		
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Wireless DAS components	10	$360.00	$3,600	Catalog price	For Alpha prototype - Task 2.4

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! XYZ Corp.	Partner to develop optimal fresnel lens for Gen 2 product - Task 2.4	$48,000	$32,000	$16,000	**$96,000**
					$0
					$0
					$0
					$0
					$0

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
	Sub-total	$0	$0	$0	$0

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! ABC Corp.	Vendor for developing custom robotics to perform lens inspection, alignment, and placement (Task 4). Required for expanding CPV module mfg. capacity. Cost is from competitive quotes.	$32,900	$86,500		**$119,400**
Construction Sub-Contractors	Detail not available at this time - forecasts included in Construction Costs.				$0
					$0
					$0
					$0
					$0
					$0
					$0
		$0	$0	$0	$0

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
		$0	$0	$0	$0

Total Contractual		$0	$0	$0	$0

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction activities:

Example Only!!! - Build wind turbine platform

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Three days of excavation for platform site EXAMPLE ONLY!!!	$28,000	Engineering estimate	Site must be prepared for construction of platform.
Budget Period 1 Total	**$0**		
Budget Period 2			

Redacted Exemption 4

General Description	Cost	Basis of Cost	Justification of need
Redacted Exemption 4			

Additional Explanations/Comments (as necessary)

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
EXAMPLE ONLY!!! Grad student tuition	$16,000	Established UCD costs	Support of graduate students working on project
Redacted Exemption 4			

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total indirect costs requested:				**$0**

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the application of the approved rate, to arrive at the proposed indirect charges proposed should also be provided.)

_____ **There is no current, federally-approved indirect rate agreement.**
(When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional Explanations/Comments (as necessary)

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
ABC Company **EXAMPLE ONLY!!!**	Cash	Project partner ABC Company will provide 40 PV modules for product development at 50% off the of the retail price of $680	$13,600			**$13,600**
						$0
						$0
		Totals	**$0**	**$0**	**$0**	**$0**

Total Project Cost: **$**Redacted Exemption 4

Cost Share Percent of Award: Redacted Exemption 4

Additional Explanations/Comments (as necessary)

Applicant Name: Sapphire Energy / GMX 2010 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$526,939		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income	$0				$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$526,939		$461,489	$40,394	$25,056
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	Redacted Exemption 4			
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$99,069	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / GMX 2011 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$99,069		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					$0

Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 2nd Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$99,069	$25,052	$24,293	$24,673	$25,052
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / GMX 2012 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner				$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / GMX 2013 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner				$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / GMX 2014 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital						$0
3. Operating Expense						$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)	$0	$0		$0	$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner				$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0	$0	$0	$0	$0
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / GMX Cummulative Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$626,008		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income			$0		$0

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Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction		Redacted Exemption 4			
9. IABR Working Capital					
10. Operating Expense					
11. R&D Partner					
12. Total (sum of lines 8 - 11)					

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction				
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Instructions and Summary

Award Number: DE-FOA-000096
Award Recipient: Sapphire / AMEC Geomatrix

Date of Submission: 6/30/2009
Form submitted by: Sapphire Energy
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel	Redacted Exemption 4					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Additional Explanations/Comments (as necessary)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
1. Generation 2A Receiver Design		**10000**		**$423,000**	**600**		**$24,000**	**800**		**$31,000**	**11400**	**$478,000**	**Actual Salary**
EXAMPLE	Sr. Engineer	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50.00	$10,000	**2400**	**$190,000**	Actual Salary
ONLY!!!	Electrical engineers	6200	$35.00	$217,000	400	$35.00	$14,000	600	$35.00	$21,000	**7200**	**$252,000**	Actual Salary
	Technician	1800	$20.00	$36,000	0	$0.00	$0	0	$0.00	$0	**1800**	**$36,000**	Actual Salary
1. Project Engineering													

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total fringe requested:	$0	$0	$0	**$0**

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information, if it has not already been provided to the Contracting Officer, OR if it has changed since it was. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the appliction of the approved rate, to arrive at the proposed fringes benefits dollars should also be provided.)

____ **There is not a current, federally approved rate agreement negotiated and available.**
(When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional explanation/comments (as necessary)

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement	2			2	$650	$1,300	Internet prices

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Thermal shock chamber	2	$20,000	$40,000	Vendor Quote	Reliability testing of PV modules- Task 4.3
			$0		
			$0		
Budget Period 1 Total			$0		
Budget Period 2					
			$0		
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Wireless DAS components	10	$360.00	$3,600	Catalog price	For Alpha prototype - Task 2.4
Redacted Exemption 4					

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! XYZ Corp.	Partner to develop optimal fresnel lens for Gen 2 product - Task 2.4	$48,000	$32,000	$16,000	**$96,000**
					$0
					$0
					$0
					$0
					$0

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
	Sub-total	$0	$0	$0	$0

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! ABC Corp.	Vendor for developing custom robotics to perform lens inspection, alignment, and placement (Task 4). Required for expanding CPV module mfg. capacity. Cost is from competitive quotes.	$32,900	$86,500		**$119,400**
					$0
					$0
					$0
					$0
					$0
					$0
					$0
		$0	$0	$0	$0

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
		$0	$0	$0	$0

Total Contractual		$0	$0	$0	$0

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

Example Only!!! - Build wind turbine platform

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Three days of excavation for platform site EXAMPLE ONLY!!!	$28,000	Engineering estimate	Site must be prepared for construction of platform.
Budget Period 1 Total	**$0**		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
EXAMPLE ONLY!!! Grad student tuition	$16,000	Established UCD costs	Support of graduate students working on project
Redacted Exemption 4			

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total indirect costs requested:				**$0**

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the application of the approved rate, to arrive at the proposed indirect charges proposed should also be provided.)

_____ **There is no current, federally-approved indirect rate agreement.**
(When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional Explanations/Comments (as necessary)

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
ABC Company **EXAMPLE ONLY!!!**	Cash	Project partner ABC Company will provide 40 PV modules for product development at 50% off the of the retail price of $680	$13,600			**$13,600**
						$0
						$0
						$0
		Totals	**$0**	**$0**	**$0**	**$0**

Total Project Cost: $Redacted Exemption 4

Cost Share Percent of Award: Redacted Exemption 4

Additional Explanations/Comments (as necessary)

Applicant Name: Sapphire Energy / B&C 2010 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$472,125		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income	$0				$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$472,126		$403,188	$43,491	$25,448
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	Redacted Exemption 4			
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$100,636	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / B&C 2011 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$100,636		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					$0

Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 2nd Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$100,635	$25,448	$24,677	$25,063	$25,448
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / B&C 2012 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner				$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / B&C 2013 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction		$0			$0
9. IABR Working Capital		$0			$0
10. Operating Expense		$0			$0
11. R&D Partner					$0
12. Total (sum of lines 8 - 11)		$0	$0	$0	$0
Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0
Section E - Budget Estimates of Federal Funds Needed for Balance of the Project					
		Future Funding Periods (Years)			
(a) Grant Program		(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction		$0			
17. IABR Working Capital		$0			
18. Operating Expense		$0			
19. R&D Partner		$0			
20. Total (sum of lines 16-19)		$0	$0	$0	$0
Section F - Other Budget Information					
21. Direct Charges		22. Indirect Charges			

23. Remarks

Applicant Name: Sapphire Energy / B&C 2014 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital						$0
3. Operating Expense						$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)	$0	$0		$0	$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner				$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0	$0	$0	$0	$0
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / B&C Cummulative Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$572,761		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income			$0		$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Authorized for Local Reproduction

Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction		Redacted Exemption 4			
9. IABR Working Capital					
10. Operating Expense					
11. R&D Partner					
12. Total (sum of lines 8 - 11)					

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction				
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Instructions and Summary

Award Number: DE-FOA-000096
Award Recipient: Sapphire / Brown and Caldwell
Date of Submission: 6/30/2009
Form submitted by: Sapphire Energy
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel	Redacted Exemption 4					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Additional Explanations/Comments (as necessary)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
1. Generation 2A Receiver Design		**10000**		**$423,000**	**600**		**$24,000**	**800**		**$31,000**	**11400**	**$478,000**	**Actual Salary**
EXAMPLE	Sr. Engineer	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50.00	$10,000	**2400**	**$190,000**	Actual Salary
ONLY!!!	Electrical engineers	6200	$35.00	$217,000	400	$35.00	$14,000	600	$35.00	$21,000	**7200**	**$252,000**	Actual Salary
	Technician	1800	$20.00	$36,000	0	$0.00	$0	0	$0.00	$0	**1800**	**$36,000**	Actual Salary
1. Project Engineering													

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total fringe requested:	$0	$0	$0	**$0**

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information, if it has not already been provided to the Contracting Officer, OR if it has changed since it was. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the appliction of the approved rate, to arrive at the proposed fringes benefits dollars should also be provided.)

____ **There is not a current, federally approved rate agreement negotiated and available.**
(When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional explanation/comments (as necessary)

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement	2			2	$650	$1,300	Internet prices

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Thermal shock chamber	2	$20,000	$40,000	Vendor Quote	Reliability testing of PV modules- Task 4.3
			$0		
			$0		
Budget Period 1 Total			$0		
Budget Period 2					
			$0		
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Wireless DAS components	10	$360.00	$3,600	Catalog price	For Alpha prototype - Task 2.4
Redacted Exemption 4					

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! XYZ Corp.	Partner to develop optimal fresnel lens for Gen 2 product - Task 2.4	$48,000	$32,000	$16,000	**$96,000**
					$0
					$0
					$0
					$0
					$0

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
	Sub-total	$0	$0	$0	$0

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! ABC Corp.	Vendor for developing custom robotics to perform lens inspection, alignment, and placement (Task 4). Required for expanding CPV module mfg. capacity. Cost is from competitive quotes.	$32,900	$86,500		**$119,400**
					$0
					$0
					$0
					$0
					$0
					$0
					$0
		$0	$0	$0	$0

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
		$0	$0	$0	$0

Total Contractual		$0	$0	$0	$0

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

Example Only!!! - Build wind turbine platform

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Three days of excavation for platform site EXAMPLE ONLY!!!	$28,000	Engineering estimate	Site must be prepared for construction of platform.
Budget Period 1 Total	**$0**		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
EXAMPLE ONLY!!! Grad student tuition	$16,000	Established UCD costs	Support of graduate students working on project
Redacted Exemption 4			

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total indirect costs requested:				**$0**

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the application of the approved rate, to arrive at the proposed indirect charges proposed should also be provided.)

_____ **There is no current, federally-approved indirect rate agreement.**
(When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional Explanations/Comments (as necessary)

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
ABC Company **EXAMPLE ONLY!!!**	Cash	Project partner ABC Company will provide 40 PV modules for product development at 50% off the of the retail price of $680	$13,600			**$13,600**
						$0
						$0
						$0
		Totals	**$0**	**$0**	**$0**	**$0**

Total Project Cost: $Redacted Exemption 4

Cost Share Percent of Award: Redacted Exemption 4

Additional Explanations/Comments (as necessary)

Instructions and Summary

Award Number: DE-FOA-000096
Award Recipient: Sapphire Energy
Date of Submission: 6/30/2009
Form submitted by: Sapphire Energy
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel	Redacted Exemption 4					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Additional Explanations/Comments (as necessary)

For simplicity of calculations, it is assumed that BP3 commences halfway through FY2012. (actual schedule is Mar 05/2012)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
1. Generation 2A Receiver Design		10000		**$423,000**	**600**		**$24,000**	**800**		**$31,000**	**11400**	**$478,000**	**Actual Salary**
EXAMPLE	Sr. Engineer	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50.00	$10,000	**2400**	**$190,000**	Actual Salary
ONLY!!!	Electrical engineers	6200	$35.00	$217,000	400	$35.00	$14,000	600	$35.00	$21,000	**7200**	**$252,000**	Actual Salary
	Technician	1800	$20.00	$36,000	0	$0.00	$0	0	$0.00	$0	**1800**	**$36,000**	Actual Salary

Redacted Exemption 4

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total fringe requested:	$0	$0	$0	**$0**

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information, if it has not already been provided to the Contracting Officer, OR if it has changed since it was. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the appliction of the approved rate, to arrive at the proposed fringes benefits dollars should also be provided.)

____ **There is not a current, federally approved rate agreement negotiated and available.**
(When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional explanation/comments (as necessary)

Detailed information for caluclation and presentation of fringe rates are not available at this time. Quoted labour rates are based on standard industry charge rates. More information will be available for presentation of fringe amounts at the time of award for further negotiation and approval of fringe rates.

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Projecct Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement	2			2	$650	$1,300	Internet prices

Redacted Exemption 4

PROJECT TOTAL	

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Thermal shock chamber	2	$20,000	$40,000	Vendor Quote	Reliability testing of PV modules- Task 4.3
Redacted Exemption 4					
PROJECT TOTAL					

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Wireless DAS components	10	$360.00	$3,600	Catalog price	For Alpha prototype - Task 2.4
Redacted Exemption 4					
PROJECT TOTAL					

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! XYZ Corp.	Partner to develop optimal fresnel lens for Gen 2 product - Task 2.4	$48,000	$32,000	$16,000	**$96,000**
NMSU	Redacted Exemption 4				

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
	Sub-total	Redacted Exemption 4			

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! ABC Corp.	Vendor for developing custom robotics to perform lens inspection, alignment, and placement (Task 4). Required for expanding CPV module mfg. capacity. Cost is from competitive quotes.	$32,900	$86,500		**$119,400**
Harris Group	Redacted Exemption 4				
AMEC Geomatrix					
Brown and Caldwell					
AMEC					

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
Sandia National Laboratories	Redacted Exemption 4				

Total Contractual		Redacted Exemption 4

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

Example Only!!! - Build wind turbine platform

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Three days of excavation for platform site EXAMPLE ONLY!!!	$28,000	Engineering estimate	Site must be prepared for construction of platform.
Redacted Exemption 4			
PROJECT TOTAL			

Additional Explanations/Comments (as necessary)

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
EXAMPLE ONLY!!! Grad student tuition	$16,000	Established UCD costs	Support of graduate students working on project

Redacted Exemption 4

PROJECT TOTAL	

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total indirect costs requested:				**$0**

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the application of the approved rate, to arrive at the proposed indirect charges proposed should also be provided.)

_____ **There is no current, federally-approved indirect rate agreement.**
(When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional Explanations/Comments (as necessary)

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
ABC Company **EXAMPLE ONLY!!!**	Cash	Project partner ABC Company will provide 40 PV modules for product development at 50% off the of the retail price of $680	$13,600			**$13,600**
Sapphire Energy	Redacted Exemption 4					
		Totals				

Total Project Cost: $ Redacted Exemption 4

Cost Share Percent of Award: Redacted Exemption 4

Additional Explanations/Comments (as necessary)

Once through the initial launch of the IABR, Operating Expenses are not requested as part of the cost share from DOE.

Applicant Name: Sapphire Energy - 2010 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$6,782,720		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income	$0				$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$6,782,719	$0	$2,785,437	$526,605	$3,470,677
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	Redacted Exemption 4			
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$36,144,782	$6,955,500	$72,185	$44,814

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy 2011 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$36,144,782		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 2nd Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$36,144,783	$11,113,548	$13,321,428	$10,311,906	$1,397,901
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	Redacted Exemption 4			
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$6,955,500	$72,185	$44,814	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy 2012 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$6,955,500		

Redacted Exemption 4

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					

Redacted Exemption 4

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 3rd Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$6,955,500	$2,988,946	$2,279,499	$1,563,754	$123,301
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	Redacted Exemption 4			
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$72,185	$44,814	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy - 2013 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$72,185		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 4th Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$61,619	$17,965	$17,420	$16,562	$9,673
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	Redacted Exemption 4			
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$44,814	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy - 2014 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$44,814		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 5th Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$38,253	$9,673	$9,380	$9,527	$9,673
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy - Cummulative Budget Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$50,000,000		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction				
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / SNL 2010 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				$0	Redacted Exemption 4	
2. IABR Working Capital				$0		
3. Operating Expense				$0		
4. R&D Partner				$127,262		
5. Totals		$0	$0	$127,262		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. **Totals** (sum of 6i-6j)					
7. Program Income	$0				$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$127,263	$0	$45,860	$41,507	$39,896
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0	$0		
17. IABR Working Capital	$0	$0		
18. Operating Expense	$0	$0		
19. R&D Partner	$147,738	$0		
20. Total (sum of lines 16-19)	$147,738	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / SNL 2011 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction					Redacted Exemption 4	
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner				$147,738		
5. Totals		$0	$0	$147,738		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					$0

Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 2nd Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$147,739	$39,272	$39,896	$40,519	$28,052
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / SNL 2012 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				$0	$0	$0
2. IABR Working Capital				$0	$0	$0
3. Operating Expense				$0	$0	$0
4. R&D Partner				$0	$0	$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner	$0			$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / SNL 2013 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction		$0			$0
9. IABR Working Capital		$0			$0
10. Operating Expense		$0			$0
11. R&D Partner		$0			$0
12. Total (sum of lines 8 - 11)		$0	$0	$0	$0
Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0
Section E - Budget Estimates of Federal Funds Needed for Balance of the Project					
		Future Funding Periods (Years)			
(a) Grant Program		(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction		$0			
17. IABR Working Capital		$0			
18. Operating Expense		$0			
19. R&D Partner		$0			
20. Total (sum of lines 16-19)		$0	$0	$0	$0
Section F - Other Budget Information					
21. Direct Charges		22. Indirect Charges			

23. Remarks

Applicant Name: Sapphire Energy / SNL 2014 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital						$0
3. Operating Expense						$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)	$0	$0		$0	$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner	$0			$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0	$0	$0	$0	$0
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / SNL Cummulative Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				$0	Redacted Exemption 4	
2. IABR Working Capital				$0		
3. Operating Expense				$0		
4. R&D Partner				$275,000		
5. Totals		$0	$0	$275,000		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income			$0		$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction		Redacted Exemption 4			
9. IABR Working Capital					
10. Operating Expense					
11. R&D Partner					
12. Total (sum of lines 8 - 11)					

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction				
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Instructions and Summary

Award Number: DE-FOA-000096
Award Recipient: Sandia National Laboratories

Date of Submission: 6/30/2009
Form submitted by: Sandia National Laboratories
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel						
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

Costs include all applicable indirect burdens and represent full cost recovery. Sandia considers specific overhead rates, including fringe rates, and individual salary information to be proprietary information and is not released externally.

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
1. Generation 2A Receiver Design		**10000**		**$423,000**	**600**		**$24,000**	**800**		**$31,000**	**11400**	**$478,000**	**Actual Salary**
EXAMPLE	Sr. Engineer	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50.00	$10,000	**2400**	**$190,000**	Actual Salary
ONLY!!!	Electrical engineers	6200	$35.00	$217,000	400	$35.00	$14,000	600	$35.00	$21,000	**7200**	**$252,000**	Actual Salary
	Technician	1800	$20.00	$36,000	0	$0.00	$0	0	$0.00	$0	**1800**	**$36,000**	Actual Salary
Low Cost Pond Liner R&D													

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

Costs include all applicable indirect burdens and represent full cost recovery. Sandia considers specific overhead rates, including fringe rates, and individual salary information to be proprietary information and is not released externally.

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total fringe requested:	$0	$0	$0	**$0**

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information, if it has not already been provided to the Contracting Officer, OR if it has changed since it was. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the appliction of the approved rate, to arrive at the proposed fringes benefits dollars should also be provided.)

____ **There is not a current, federally approved rate agreement negotiated and available.**
(When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional explanation/comments (as necessary)

Costs include all applicable indirect burdens and represent full cost recovery. Sandia considers specific overhead rates, including fringe rates, and individual salary information to be proprietary information and is not released externally.

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Projecct Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement	2			2	$650	$1,300	Internet prices
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
						$0	
						$0	
						$0	
International Travel subtotal						$0	
Budget Period 1 Total						**$0**	

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 2							
Domestic Travel							
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
						$0	
						$0	
						$0	
International Travel subtotal						$0	
Budget Period 2 Total						**$0**	
Budget Period 3							
Domestic Travel							
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
						$0	
						$0	
						$0	
International Travel subtotal						$0	
Budget Period 3 Total						**$0**	
PROJECT TOTAL						**$0**	

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Thermal shock chamber	2	$20,000	$40,000	Vendor Quote	Reliability testing of PV modules- Task 4.3
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
Budget Period 1 Total			$0		
Budget Period 2					
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
Budget Period 2 Total			$0		

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 3					
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Wireless DAS components	10	$360.00	$3,600	Catalog price	For Alpha prototype - Task 2.4
			$0		
Budget Period 1 Total			**$0**		
Budget Period 2					
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! XYZ Corp.	Partner to develop optimal fresnel lens for Gen 2 product - Task 2.4	$48,000	$32,000	$16,000	**$96,000**
					$0
					$0
					$0
					$0
					$0

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
	Sub-total	$0	$0	$0	$0

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! ABC Corp.	Vendor for developing custom robotics to perform lens inspection, alignment, and placement (Task 4). Required for expanding CPV module mfg. capacity. Cost is from competitive quotes.	$32,900	$86,500		**$119,400**
					$0
					$0
					$0
					$0
					$0
					$0
					$0
		$0	$0	$0	$0

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
		$0	$0	$0	$0

Total Contractual		$0	$0	$0	$0

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

Example Only!!! - Build wind turbine platform

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Three days of excavation for platform site EXAMPLE ONLY!!!	$28,000	Engineering estimate	Site must be prepared for construction of platform.
Budget Period 1 Total	**$0**		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
EXAMPLE ONLY!!! Grad student tuition	$16,000	Established UCD costs	Support of graduate students working on project
Budget Period 1 Total	$0		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total indirect costs requested:				**$0**

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the application of the approved rate, to arrive at the proposed indirect charges proposed should also be provided.)

_____ **There is no current, federally-approved indirect rate agreement.**
(When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional Explanations/Comments (as necessary)

Costs include all applicable indirect burdens and represent full cost recovery. Sandia considers specific overhead rates, including fringe rates, and individual salary information to be proprietary information and is not released externally.

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
ABC Company **EXAMPLE ONLY!!!**	Cash	Project partner ABC Company will provide 40 PV modules for product development at 50% off the of the retail price of $680	$13,600			**$13,600**
						$0
		Totals	**$0**	**$0**	**$0**	**$0**

Total Project Cost: $ Redacted Exemption 4

Cost Share Percent of Award: Redacted Ex. 4

Additional Explanations/Comments (as necessary)

DOE O 412.1
4-20-99

U.S. DEPARTMENT OF ENERGY
FIELD WORK PROPOSAL

1. Work Proposal Number:	2. Revision Number:	3. Date Prepared: 6/15/2009

4. Work Proposal Title: Sapphire Integrated Algal Biorefinery (IABR)	5. Budget and Reporting Code: BM0102070

6. Work Proposal Term: Begin 02/01/2010 End 09/01/2011

7. Name: (Last, First, MI) (Phone Number) DOE Program Manager To Be Determined	8. DOE Organization: Energy Efficiency and Renewable Energy, Office of Biomass
9. DOE Field Element Work Proposal Reviewer: Dan Sanchez	10. DOE Field Element: Sandia Site Office
11. Contractor Work Proposal Manager: Marjorie Tatro	12. Contractor Name: Sandia National Laboratories

13. Proposal Description (Approach, Anticipated Benefit in 200 Words or Less):

Current commercial biofuels include ethanol from corn and biodiesel from plant oils. Research also focuses on ethanol and higher value fuels from energy crops such as switch grass. A third generation biofuel is oils derived from algae. Algae have the capacity to produce and store high levels of a variety of biofuel precursor molecules including triglycerides and fatty acids. In addition, algae uses land and water resources not otherwise suitable for high productivity agriculture.

In this project, Sandia joins Sapphire Energy to develop a fully integrated demonstration-scale (50 tons/day biomass) refinery to produce jet fuel from algae-based oils. Sapphire will build and operate the refinery including each step of the process chain from cultivation, harvesting, and oil extraction, to fuel conversion. Sandia will conduct applied research to develop and implement tools for the biorefinery. Sandia will

Redacted Exemption 4

14. Contractor Work Proposal Manager:	15. DOE Field Element Official:
Donna Filips for Marjorie Tatro 6-24-09	
(Signature) (Date)	(Signature) (Date)

16. Detail Attachments: (See Attachments)

- ☐ a. Facility Requirements
- ☐ b. Publications
- ☐ c. Purpose
- ☐ d. Background
- ☐ e. Approach
- ☐ f. Technical progress
- ☐ g. Future Accomplishments
- ☐ h. Relationships to Other Projects
- ☐ i. NEPA Requirements
- ☐ j. Milestones
- ☐ k. Deliverables
- ☐ l. Perform measures/expectations
- ☐ m. ES&H Considerations
- ☐ n. Human/Animal Subjects
- ☐ o. Other (Specify)

DOE O 412.1
4-20-99

WORK PROPOSAL REQUIREMENTS FOR OPERATING/EQUIPMENT OBLIGATIONS AND COSTS

Contractor Name:	Work Proposal #:	Rev. No.:	Date Prepared: 6/15/2009

	Prior Years	BY -1	Budget Year		BY + 1	BY + 2	Total to Complete
			Request	Authorized			
17. Staffing (staff years):							
a. Scientific							
b. Other Direct							
c. Total Direct							
18. Operating Expense:							
a. Total Obligations							
b. Total Costs							
19. Equipment:							
a. Equipment Obligations							
b. Equipment Costs							

Redacted Exemption 4

20. Milestone Schedule:	Proposed	Authorized
FY11	**1. Constitutive relation development.**	
FY12	**2. Adaption to a pilot-scale study.**	
FY11-12	**3. In Situ biomass characterization.**	
FY11-12	**4. In Situ lipid characterization.**	

21. Reporting Requirements (Description):

Sandia National Laboratories
Operated for the U.S. Department of Energy by
Sandia Corporation
Albuquerque, NM 87185-1104
Phone: 505-844-3154
Fax: 505-284-5406
Internet: mltatro@sandia.gov

Marjorie L. Tatro
Director, Fuel and Water Systems

June 3, 2009

Manager, Sandia Site Office
National Nuclear Security Administration
U. S. Department of Energy
MS-0184
P. O. Box 5400
Albuquerque, NM 87185-5400

Attention: David A. Ferguson

Subject: Request for Approval: Participation with Sapphire Energy in Response to DOE solicitation DE-FOA-0000096, "Recovery Act - Demonstration of Integrated Biorefinery Operations"

Dear Mr. Ferguson:

As DOE contracting officer for Sandia, we are requesting your approval of Sandia National Laboratories' participation in a project with Sapphire Energy (Sapphire). This partnership has formed in response to DOE solicitation DE-FOA-0000096, "Recovery Act - Demonstration of Integrated Biorefinery Operations." The partnership is described in the paragraphs to follow.

Background

Current commercial biofuel production is based on fermentative ethanol production, primarily from corn or sugarcane, and biodiesel derived from plant oils. With rising food prices, there is concern that expanded production of biofuels from these sugar, oil, and starch grain crop-based sources is not sustainable. An alternative approach to sustainable biofuels development may lie in the use of 'green crude oils' derived from algae. Algae have the capacity to produce and store high levels of a variety of biofuel precursor molecules including triglycerides, fatty acids, isoprenoids and other neutral lipids. Algae can also be grown using land and water resources not otherwise suitable for high productivity agriculture.

Sandia seeks to join Sapphire Energy in response to the above stated solicitation from DOE's Office of Energy Efficiency and Renewable Energy (EERE). The project will develop a fully integrated demonstration-scale (50 tons/day biomass) refinery to produce jet fuel from algae-based oils. The current solicitation seeks to advance the fundamental science of biomaterials to deployment stage. Sapphire will

Redacted Exemption 4

The title of the proposal is "Sapphire Integrated Algal Biorefinery (IABR)." This collaboration is between Sapphire and Sandia National Laboratories and will bring together scientists from industry and a national lab to produce a team that brings expertise toward an important and complex problem.

Direct Benefit to DOE

This partnership will directly benefit DOE's Office of Energy Efficiency and Renewable Energy by providing data and feasibility studies on the readiness of biomaterials and especially algae as an alternative source of transportation fuels. This addresses several critical areas identified by DOE reports. These reports include "From Biomass to Biofuels: A Roadmap to the Energy Future," "Systems Biology for Energy and the Environment", and "The U.S. Department of Energy's Aquatic Species Program: Biodiesel from Algae." The new Secretary of Energy, Steven Chu, is an ardent supporter of biofuels. In his previous position, as Lab Director of Lawrence Berkeley Laboratories he worked with Sandia to secure the Joint BioEnergy Institute (JBEI), a DOE Office of Biological and Environmental Research laboratory doing fundamental research in cellulosic-based biofuels. In his recent address at Sandia National Laboratories, Dr. Chu highlighted JBEI. Continued biofuels research in an algae-based integrated biorefinery will contribute further to this mission.

Mission Relevance

A core mission of Sandia National Laboratories is the development of sustainable energy sources for the 21st century. Under the scope of this core mission, Sandia National Laboratories' will apply our unique capabilities in remote sensing, advanced spectral imaging, multivariate data analysis, and computational fluid dynamic modeling to assist in the development of a demonstration scale algae-based biorefinery. This effort will directly support the ST&E SMU Bioscience Research Foundation's mission focus on Bioenergy as well as impact the ERN SMU F&W mission focus on providing Fuels for the 21st Century.

Impacts on Execution of Assigned Programs for Sandia National Laboratories

There will be no adverse impacts on the assigned programs at Sandia National Laboratories. This determination is based on the fact that

Redacted Exemption 4

Domestic Private Sector Considerations

Sandia National Laboratories participation in this partnership will not place Sandia in direct competition with the domestic private sector. Sandia's unique capabilities in remote sensing, advanced spectral imaging, multivariate data analysis, and computational fluid dynamic modeling and application of these techniques in biorefinery design seeks to assist U.S. industry through a partnership with Sapphire Energy. The knowledge gained on technique development in this partnership at Sandia will be disseminated through the DOE, industrial, and academic (e.g., scientific meetings) channels of communication and will directly benefit the commercial development of the technology in the private sector.

Future Burden on DOE and Sandia Resources

There will be no additional burden on existing DOE and Sandia resources. The proposed partnership aligns and benefits closely with ongoing funded Energy, Resources and Nonproliferation missions at Sandia and within DOE.

Your timely consideration of this request will be greatly appreciated. If you need further information, please do not hesitate to call Anthony Martino, Manager of Bioenergy and Defense Technologies, (505) 844-0652.

Sincerely,

Donna Filip for

Marjorie L. Tatro
Director, Fuel and Water Systems
Center 6200

Based on the above, authorization is granted for Sandia National Laboratories to participate with Sapphire Energy in Response to DOE solicitation DE-FOA-0000096, "Recovery Act - Demonstration of Integrated Biorefinery Operations". The work proposed for the laboratory is consistent with, or complimentary to, the missions of the laboratory and will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory.

6/22/09

David A. Ferguson, DOE/NNSA/SSO Date
Contracting Officer

Copy to:
Sapphire Energy
MS-1104 Marjorie Tatro, 6200
MS-0895 Anthony Martino, 8622
MS-0115 Pat Hubbard, 10112
MS-0184 SSO Program Office

Grant Application Package

Opportunity Title:	Recovery Act - Demonstration of Integrated Biorefinery
Offering Agency:	Golden Field Office
CFDA Number:	81.087
CFDA Description:	Renewable Energy Research and Development
Opportunity Number:	DE-FOA-0000096
Competition ID:	
Opportunity Open Date:	05/06/2009
Opportunity Close Date:	06/30/2009
Agency Contact:	ibr_foa@go.doe.gov

This electronic grants application is intended to be used to apply for the specific Federal funding opportunity referenced here.

If the Federal funding opportunity listed is not the opportunity for which you want to apply, close this application package by clicking on the "Cancel" button at the top of this screen. You will then need to locate the correct Federal funding opportunity, download its application and then apply.

☐ **I will be submitting applications on my behalf, and not on behalf of a company, state, local or tribal government, academia, or other type of organization.**

*** Application Filing Name:** Sapphire Integrated Algal Biorefinery

Mandatory Documents

Move Form to Complete

Move Form to Delete

Mandatory Documents for Submission

- Application for Federal Assistance (SF-424)
- Project/Performance Site Location(s)
- Other Attachments Form

Optional Documents

- Disclosure of Lobbying Activities (SF-LLL)

Move Form to Submission List

Move Form to Delete

Optional Documents for Submission

Instructions

1 **Enter a name for the application in the Application Filing Name field.**

- This application can be completed in its entirety offline; however, you will need to login to the Grants.gov website during the submission process.
- You can save your application at any time by clicking the "Save" button at the top of your screen.
- The "Save & Submit" button will not be functional until all required data fields in the application are completed and you clicked on the "Check Package for Errors" button and confirmed all data required data fields are completed.

2 **Open and complete all of the documents listed in the "Mandatory Documents" box. Complete the SF-424 form first.**

- It is recommended that the SF-424 form be the first form completed for the application package. Data entered on the SF-424 will populate data fields in other mandatory and optional forms and the user cannot enter data in these fields.

- The forms listed in the "Mandatory Documents" box and "Optional Documents" may be predefined forms, such as SF-424, forms where a document needs to be attached, such as the Project Narrative or a combination of both. "Mandatory Documents" are required for this application. "Optional Documents" can be used to provide additional support for this application or may be required for specific types of grant activity. Reference the application package instructions for more information regarding "Optional Documents".

- To open and complete a form, simply click on the form's name to select the item and then click on the => button. This will move the document to the appropriate "Documents for Submission" box and the form will be automatically added to your application package. To view the form, scroll down the screen or select the form name and click on the "Open Form" button to begin completing the required data fields. To remove a form/document from the "Documents for Submission" box, click the document name to select it, and then click the <= button. This will return the form/document to the "Mandatory Documents" or "Optional Documents" box.

- All documents listed in the "Mandatory Documents" box must be moved to the "Mandatory Documents for Submission" box. When you open a required form, the fields which must be completed are highlighted in yellow with a red border. Optional fields and completed fields are displayed in white. If you enter invalid or incomplete information in a field, you will receive an error message.

3 **Click the "Save & Submit" button to submit your application to Grants.gov.**

- Once you have properly completed all required documents and attached any required or optional documentation, save the completed application by clicking on the "Save" button.
- Click on the "Check Package for Errors" button to ensure that you have completed all required data fields. Correct any errors or if none are found, save the application package.
- The "Save & Submit" button will become active; click on the "Save & Submit" button to begin the application submission process.
- You will be taken to the applicant login page to enter your Grants.gov username and password. Follow all onscreen instructions for submission.

OMB Number: 4040-0004
Expiration Date: 01/31/2009

Application for Federal Assistance SF-424 Version 02

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify)

* 3. Date Received: Completed by Grants.gov upon submission.

4. Applicant Identifier: Sapphire Energy

5a. Federal Entity Identifier:

* 5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: Sapphire Energy, Inc

* b. Employer/Taxpayer Identification Number (EIN/TIN): Redacted Exemption 3

* c. Organizational DUNS: 798830688

d. Address:

* Street1: 3115 Merryfield Row
Street2:
* City: San Diego
County: San Diego
* State: CA: California
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 92121-1125

e. Organizational Unit:

Department Name: Sapphire Corporate Office

Division Name: Grants Applications

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: Dr.
* First Name: Kulinda
Middle Name:
* Last Name: Davis
Suffix:

Title: Senior Director of Product Development

Organizational Affiliation: Sapphire Energy, Inc

* Telephone Number: 858-736-1778
Fax Number: 888-501-8353

* Email: kulinda.davis@sapphireenergy.com

OMB Number: 4040-0004
Expiration Date: 01/31/2009

Application for Federal Assistance SF-424

Version 02

9. Type of Applicant 1: Select Applicant Type:

Q: For-Profit Organization (Other than Small Business)

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Golden Field Office

11. Catalog of Federal Domestic Assistance Number:

81.087

CFDA Title:

Renewable Energy Research and Development

*** 12. Funding Opportunity Number:**

DE-FOA-0000096

* Title:

Recovery Act - Demonstration of Integrated Biorefinery Operations

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Luna County, Columbus New Mexico
Dona Ana County, Las Cruces, New Mexico

*** 15. Descriptive Title of Applicant's Project:**

Sapphire Integrated Algal Biofinery (IABR)

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

OMB Number: 4040-0004
Expiration Date: 01/31/2009

Application for Federal Assistance SF-424

Version 02

16. Congressional Districts Of:

* a. Applicant: CA-053

* b. Program/Project: NM-002

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 01/04/2010

* b. End Date: 09/30/2014

18. Estimated Funding ($):

* a. Federal	50,000,000.00
* b. Applicant	Redacted Exemption 4
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	Redacted Exemption 4

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☐ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes", provide explanation.)**

☐ Yes ☒ No Explanation

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: Dr.

* First Name: Jason

Middle Name: Lee

* Last Name: Pyle

Suffix:

* Title: Chief Executive Officer

* Telephone Number: 858-699-2767

Fax Number: 888-501-8353

* Email: jason.pyle@sapphireenergy.com

* Signature of Authorized Representative: Completed by Grants.gov upon submission.

* Date Signed: Completed by Grants.gov upon submission.

Application for Federal Assistance SF-424 Version 02

*** Applicant Federal Debt Delinquency Explanation**

The following field should contain an explanation if the Applicant organization is delinquent on any Federal Debt. Maximum number of characters that can be entered is 4,000. Try and avoid extra spaces and carriage returns to maximize the availability of space.

Other Attachment File(s)

*** Mandatory Other Attachment Filename:** Project.pdf

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

OMB Number: 4040-0010
Expiration Date: 08/31/2011

Project/Performance Site Location(s)

Project/Performance Site Primary Location

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tribal government, academia, or other type of organization.

Organization Name: Sapphire Energy

DUNS Number: 7988306880000

* Street1: SW portion of Luna County, West of Columbus, NM & HWY 9

Street2:

* City: Columbus

County: Luna

* State: NM: New Mexico

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 88029-9800

* Project/ Performance Site Congressional District: NM-002

Project/Performance Site Location 1

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tribal government, academia, or other type of organization.

Organization Name: Sapphire Energy

DUNS Number: 7988306880000

* Street1: 9035 Advancement Avenue

Street2:

* City: Las Cruces

County: Dona Ana

* State: NM: New Mexico

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 88007-9004

* Project/ Performance Site Congressional District: NM-002

Project/Performance Site Location 2

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tribal government, academia, or other type of organization.

Organization Name: Sapphire Energy

DUNS Number: 7988306880000

* Street1: 3115 Merryfield Row

Street2:

* City: San Diego

County: San Diego

* State: CA: California

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 92121-1125

* Project/ Performance Site Congressional District: CA-053

Applicant Name: Sapphire Energy / HG 2010 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$551,385		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income	$0				$0

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Authorized for Local Reproduction

Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$551,386		$481,279	$45,964	$24,143
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	Redacted Exemption 4			
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$71,332	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / HG 2011 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$71,332		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					$0

Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 2nd Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$71,332	$23,412	$23,777	$24,143	$0
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / HG 2012 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner				$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / HG 2013 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction		$0			$0
9. IABR Working Capital		$0			$0
10. Operating Expense		$0			$0
11. R&D Partner					$0
12. Total (sum of lines 8 - 11)		$0	$0	$0	$0
Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0
Section E - Budget Estimates of Federal Funds Needed for Balance of the Project					
		Future Funding Periods (Years)			
(a) Grant Program		(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction		$0			
17. IABR Working Capital		$0			
18. Operating Expense		$0			
19. R&D Partner		$0			
20. Total (sum of lines 16-19)		$0	$0	$0	$0
Section F - Other Budget Information					
21. Direct Charges		22. Indirect Charges			

23. Remarks

Applicant Name: Sapphire Energy / HG 2014 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction						$0
2. IABR Working Capital						$0
3. Operating Expense						$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)	$0	$0		$0	$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner				$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0	$0	$0	$0	$0
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / HG Cummulative Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR Construction				Redacted Exemption 4		
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner						
5. Totals		$0	$0	$622,717		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income			$0		$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction		Redacted Exemption 4			
9. IABR Working Capital					
10. Operating Expense					
11. R&D Partner					
12. Total (sum of lines 8 - 11)					

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction				
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Instructions and Summary

Award Number: DE-FOA-000096
Award Recipient: Sapphire / Harris Group

Date of Submission: 6/30/2009
Form submitted by: Sapphire Energy
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel	Redacted Exemption 4					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Additional Explanations/Comments (as necessary)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
1. Generation 2A Receiver Design		**10000**		**$423,000**	**600**		**$24,000**	**800**		**$31,000**	**11400**	**$478,000**	**Actual Salary**
EXAMPLE	Sr. Engineer	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50.00	$10,000	**2400**	**$190,000**	Actual Salary
ONLY!!!	Electrical engineers	6200	$35.00	$217,000	400	$35.00	$14,000	600	$35.00	$21,000	**7200**	**$252,000**	Actual Salary
	Technician	1800	$20.00	$36,000	0	$0.00	$0	0	$0.00	$0	**1800**	**$36,000**	Actual Salary

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total fringe requested:	$0	$0	$0	**$0**

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information, if it has not already been provided to the Contracting Officer, OR if it has changed since it was. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the appliction of the approved rate, to arrive at the proposed fringes benefits dollars should also be provided.)

____ **There is not a current, federally approved rate agreement negotiated and available.**
(When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional explanation/comments (as necessary)

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement	2			2	$650	$1,300	Internet prices

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Thermal shock chamber	2	$20,000	$40,000	Vendor Quote	Reliability testing of PV modules- Task 4.3
			$0		
			$0		
Budget Period 1 Total			$0		
Budget Period 2					
			$0		
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Wireless DAS components	10	$360.00	$3,600	Catalog price	For Alpha prototype - Task 2.4
Redacted Exemption 4					

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! XYZ Corp.	Partner to develop optimal fresnel lens for Gen 2 product - Task 2.4	$48,000	$32,000	$16,000	**$96,000**
					$0
					$0
					$0
					$0
					$0

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
	Sub-total	$0	$0	$0	$0

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! ABC Corp.	Vendor for developing custom robotics to perform lens inspection, alignment, and placement (Task 4). Required for expanding CPV module mfg. capacity. Cost is from competitive quotes.	$32,900	$86,500		**$119,400**
					$0
					$0
					$0
					$0
					$0
					$0
					$0
		$0	$0	$0	$0

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
		$0	$0	$0	$0

Total Contractual		$0	$0	$0	$0

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

Example Only!!! - Build wind turbine platform

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Three days of excavation for platform site EXAMPLE ONLY!!!	$28,000	Engineering estimate	Site must be prepared for construction of platform.
Budget Period 1 Total	**$0**		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
EXAMPLE ONLY!!! Grad student tuition	$16,000	Established UCD costs	Support of graduate students working on project

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total indirect costs requested:				**$0**

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the application of the approved rate, to arrive at the proposed indirect charges proposed should also be provided.)

_____ **There is no current, federally-approved indirect rate agreement.**
(When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional Explanations/Comments (as necessary)

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
ABC Company **EXAMPLE ONLY!!!**	Cash	Project partner ABC Company will provide 40 PV modules for product development at 50% off the of the retail price of $680	$13,600			**$13,600**
						$0
						$0
						$0
		Totals	**$0**	**$0**	**$0**	**$0**

Total Project Cost: $ Redacted Exemption 4

Cost Share Percent of Award: Redacted Exemption 4

Additional Explanations/Comments (as necessary)

Applicant Name: Sapphire Energy / NMSU 2010 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. IABR Construction					Redacted Exemption 4	
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner				$72,619		
5. Totals		$0	$0	$72,619		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income	$0				$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$72,619	$0	$12,900	$29,690	$30,029
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0	$0		
17. IABR Working Capital	$0	$0		
18. Operating Expense	$0	$0		
19. R&D Partner	$39,882	$0		
20. Total (sum of lines 16-19)	$39,882	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / NMSU 2011 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. IABR Construction					Redacted Exemption 4	
2. IABR Working Capital						
3. Operating Expense						
4. R&D Partner				$39,882		
5. Totals		$0	$0	$39,882		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 2nd Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$39,882	$29,559	$10,323	$0	$0
14. Non-Federal	Redacted Exemption 4				
15. Total (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / NMSU 2012 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. IABR Construction					$0	$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner					$0	$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner	$0			$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / NMSU 2013 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. IABR Construction					$0	$0
2. IABR Working Capital					$0	$0
3. Operating Expense					$0	$0
4. R&D Partner					$0	$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)					$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	$0			$0
9. IABR Working Capital	$0			$0
10. Operating Expense	$0			$0
11. R&D Partner	$0			$0
12. Total (sum of lines 8 - 11)	$0	$0	$0	$0

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction	$0			
17. IABR Working Capital	$0			
18. Operating Expense	$0			
19. R&D Partner	$0			
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Sapphire Energy / NMSU 2014 Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. IABR Construction						$0
2. IABR Working Capital						$0
3. Operating Expense						$0
4. R&D Partner						$0
5. Totals		$0	$0	$0	$0	$0

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel					$0
b. Fringe Benefits					$0
c. Travel					$0
d. Equipment					$0
e. Supplies					$0
f. Contractual					$0
g. Construction					$0
h. Other					$0
i. Total Direct Charges (sum of 6a-6h)	$0	$0		$0	$0
j. Indirect Charges					$0
k. Totals (sum of 6i-6j)	$0	$0	$0	$0	$0
7. Program Income					$0

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Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction		$0			$0
9. IABR Working Capital		$0			$0
10. Operating Expense		$0			$0
11. R&D Partner		$0			$0
12. Total (sum of lines 8 - 11)		$0	$0	$0	$0
Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0	$0	$0	$0	$0
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0
Section E - Budget Estimates of Federal Funds Needed for Balance of the Project					
		Future Funding Periods (Years)			
(a) Grant Program		(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction		$0			
17. IABR Working Capital		$0			
18. Operating Expense		$0			
19. R&D Partner		$0			
20. Total (sum of lines 16-19)		$0	$0	$0	$0
Section F - Other Budget Information					
21. Direct Charges		22. Indirect Charges			

23. Remarks

Applicant Name: Sapphire Energy / NMSU Cummulative Award Number: DE-FOA-000096

Sapphire Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. IABR Construction				$0	Redacted Exemption 4	
2. IABR Working Capital				$0		
3. Operating Expense				$0		
4. R&D Partner				$112,500		
5. Totals		$0	$0	$112,500		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	IABR Construction	IABR Working Capital	Operating Expense	R&D Partner	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income			$0		$0

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Section C - Non-Federal Resources					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8. IABR Construction	Redacted Exemption 4			
9. IABR Working Capital				
10. Operating Expense				
11. R&D Partner				
12. Total (sum of lines 8 - 11)				

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$0				
14. Non-Federal	$0				
15. Total (sum of lines 13 and 14)	$0	$0	$0	$0	$0

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. IABR Construction				
17. IABR Working Capital				
18. Operating Expense				
19. R&D Partner				
20. Total (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges

23. Remarks

Instructions and Summary

Award Number: DE-FOA-000096
Award Recipient: Sapphire / NMSU

Date of Submission: 6/30/2009
Form submitted by: Sapphire Energy
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel	Redacted Exemption 4					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Additional Explanations/Comments (as necessary)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
1. Generation 2A Receiver Design		**10000**		**$423,000**	**600**		**$24,000**	**800**		**$31,000**	**11400**	**$478,000**	**Actual Salary**
EXAMPLE	Sr. Engineer	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50.00	$10,000	**2400**	**$190,000**	Actual Salary
ONLY!!!	Electrical engineers	6200	$35.00	$217,000	400	$35.00	$14,000	600	$35.00	$21,000	**7200**	**$252,000**	Actual Salary
	Technician	1800	$20.00	$36,000	0	$0.00	$0	0	$0.00	$0	**1800**	**$36,000**	Actual Salary
Low Cost Pond Liner R&D													
		Redacted Exemption 4											
	Total Personnel Costs												

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total fringe requested:	$0	$0	$0	**$0**

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information, if it has not already been provided to the Contracting Officer, OR if it has changed since it was. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the appliction of the approved rate, to arrive at the proposed fringes benefits dollars should also be provided.)

____ **There is not a current, federally approved rate agreement negotiated and available.**
(When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional explanation/comments (as necessary)

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Projecct Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement	2			2	$650	$1,300	Internet prices
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
International Travel subtotal						$0	
Budget Period 1 Total						**$0**	
Budget Period 2							
Domestic Travel							
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
International Travel subtotal						$0	
Budget Period 2 Total						**$0**	
Budget Period 3							
Domestic Travel							
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
International Travel subtotal						$0	
Budget Period 3 Total						**$0**	
PROJECT TOTAL						**$0**	

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Thermal shock chamber	2	$20,000	$40,000	Vendor Quote	Reliability testing of PV modules- Task 4.3
			$0		
			$0		
Budget Period 1 Total			$0		
Budget Period 2					
			$0		
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Wireless DAS components	10	$360.00	$3,600	Catalog price	For Alpha prototype - Task 2.4
			$0		
			$0		
Budget Period 1 Total			**$0**		
Budget Period 2					
			$0		
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! XYZ Corp.	Partner to develop optimal fresnel lens for Gen 2 product - Task 2.4	$48,000	$32,000	$16,000	**$96,000**
					$0
					$0
					$0
					$0
					$0

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
	Sub-total	$0	$0	$0	$0

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! ABC Corp.	Vendor for developing custom robotics to perform lens inspection, alignment, and placement (Task 4). Required for expanding CPV module mfg. capacity. Cost is from competitive quotes.	$32,900	$86,500		**$119,400**
					$0
					$0
					$0
					$0
					$0
					$0
					$0
		$0	$0	$0	$0

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
		$0	$0	$0	$0

Total Contractual		$0	$0	$0	$0

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

Example Only!!! - Build wind turbine platform

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Three days of excavation for platform site EXAMPLE ONLY!!!	$28,000	Engineering estimate	Site must be prepared for construction of platform.
Budget Period 1 Total	**$0**		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
EXAMPLE ONLY!!! Grad student tuition	$16,000	Established UCD costs	Support of graduate students working on project
Budget Period 1 Total	$0		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total indirect costs requested:				**$0**

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the application of the approved rate, to arrive at the proposed indirect charges proposed should also be provided.)

_____ **There is no current, federally-approved indirect rate agreement.**
(When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional Explanations/Comments (as necessary)

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
ABC Company **EXAMPLE ONLY!!!**	Cash	Project partner ABC Company will provide 40 PV modules for product development at 50% off the of the retail price of $680	$13,600			**$13,600**
						$0
						$0
		Totals	**$0**	**$0**	**$0**	**$0**

Total Project Cost: $Redacted Exemption 4

Cost Share Percent of Award: Redacted Exemption 4

Additional Explanations/Comments (as necessary)

BUSINESS AND COMMERCIALIZATION PLAN

1. Goal and Budget Alignment

The overall goal of the Sapphire Integrated Algal Biorefinery (IABR) is to demonstrate that the algae to biofuel process scales with favorable economics. By commencing construction in 2010 and spending $ Redacted Exemption 4 , the IABR will realize the following objectives:

- Design and Construction: Redacted Exemption 4
- Shakedown and Testing: Redacted Exemption 4
- Steady-state Operations: Redacted Exemption 4
- Commercialization: Redacted Exemption 4

To achieve the objectives above, Sapphire has developed a comprehensive Work Breakdown Structure and Resource Loaded Schedule (refer to the Project Execution Plan) and *pro forma* that illustrates how these objectives will be accomplished. Table 1 presents a summary of the key project phases, activities, completion timelines and corresponding budget.

Table 1: IABR Project Phases and Expected Dates of Completion

Objective #	WBS Element	Duration	Budget
1: Design and Construction	Redacted Exemption 4		
2: Shakedown and Testing			
3: Steady-state operations			
4: Commercialization			

2. Value Proposition

The Sapphire IABR has been carefully planned to address the demands of our time (Table 2).

Table 2: Stated Goals of IABR Relative to Important Stakeholders

Stakeholder	Goal	IABR Proposal
President Obama	• Reduce U.S. imports of foreign oil by 10 million barrels per day	• Project with clear scalability to exceed 1 million barrels per day of domestic fuel production (15 billion gallons/year)
American Recovery & Reinvestment Act of 2009	• Stimulate U.S. economy • Create sustainable jobs	• All IABR costs and revenues will flow directly to U.S. businesses and jobs • Immediate jobs: 30 • New 'green collar' jobs by 2030: more than 16,000
DOE Energy Efficiency and Renewable Energy Program (EERE)	• Reduce or end dependence of foreign oil • Spur the creation of a domestic bio-industry	• Development of a fundamentally new and widely scalable bio-industry that does not compete with existing resources or markets

Furthermore, Sapphire's algae oil will address the five primary unmet needs of the U.S. transportation fuels market (Table 3).

Table 3: Sapphire's Fuel Addresses Unmet Needs in the U.S. Transportation Fuels Market

#	Unmet Needs	How Sapphire's Biofuels Addresses These Needs
1	Fuels that are 100% "drop-in solutions"	• Compatible with existing oil and fuel movement infrastructure (e.g., pipelines, terminals) • Compatible with existing refining infrastructure • Compatible with existing fleet of land and air vehicles (e.g., cars, trucks, jets)
2	Fuels derived from feedstocks that do not compete with food crops	• Uses no agricultural products already in use • Uses marginal land
3	Fuels with a favorable CO_2 life cycle when compared to conventional petroleum	• Completely renewable • Consumes CO_2 from atmospheric and anthropogenic sources (e.g., coal plants) • No indirect land use issues • At least 50% lower lifecycle emissions than gasoline
4	Fuels that can be produced domestically and that can compete in price with petroleum	• Located throughout the Southwest U.S. and beyond • Produced at target cost < $80 per barrel
5	Fuels that can be scaled to meaningfully displace petroleum sources	• Scalable to > 1 million barrels per day in the U.S.

3. Commercialization of the Sapphire Technology

3.1. Vision for commercialization

The environmental sustainability of biofuels produced primarily from food crops has been increasingly scrutinized. Concerns related to life cycle analyses suggest that these biofuels may have unfavorable carbon footprints, even without the penalty of an indirect land use charge. Furthermore, these

alternative fuels compete with agricultural crops for land, water, and other resources and are not economically viable. Similarly, to date, the commercialization of biofuels produced from non-food biomass (i.e., plant-based) has been extremely limited as issues of scalability and feedstock availability render the production costs prohibitively high.

Algae oil production dwarfs that of all terrestrial plants because of the enormous advantage algae have in the photosynthetic conversion of CO_2 to hydrocarbon precursors. Based on the fact that algae are 40x more efficient at converting sunlight to hydrocarbon than terrestrial plants, Sapphire is well positioned to meet future demands for drop-in petroleum substitutes. Much of the work that will be performed at the IABR will be geared towards validating the technical and economic feasibility of scaling algal oil production to volumes that will meaningfully impact the marketplace.

The Sapphire-led IABR consortium comprising of world class experts described in the Project Execution Plan will continue to collaborate in the design, operations and deployment of future 150 million gallons per year (10,000 barrels per day) commercial algal biorefineries (CABs) in Redacted Exemption 4

Table 4 provides a summary of the IABR and envisioned 1st CAB that will be developed

Redacted Exemption 4

The region is in proximity to the Permian Basin oil and gas infrastructure, linking it by rail and pipeline to the U.S. Gulf Coast, one of the world's largest hubs of liquid transportation fuel infrastructure.

Commercialization of algae to biofuel will be achieved by

Redacted Exemption 4

In order to construct its first commercial facility, Sapphire expects to encounter a series of challenges based on the experience of the development team discussed in Section 7 (Business Risks).

Table 4: IABR and 1st Commercial Algal Biorefinery Quick Facts

Project detail	Units	IABR	1st CAB
Project Capital Costs	million	Redacted Exemption 4	
Algal growth unit operation	acres		
Number of growth units	units		
CO_2 capture	metric tons/day		
CO_2 utilization	%		
Extractable oil fraction	%		
Algal oil	million gallons per year	1.5	150
Fuel product(s)		Diesel and Jet	Diesel

3.2. Commercial Algal Biorefinery Key Processes Technology and Operations

The CABs will utilize the same key processes, operations, and technologies that will be demonstrated at the IABR. An overview of the process modules is below and a detailed description is presented in the Project Execution Plan, PFDs, and Supporting Data. Specifically, the CAB PFD presents the basic process concept and project mass and energy balance of the 1st CAB.

Sapphire's core technology is one in which algae seed, CO_2, brackish water, and nutrients are introduced to the system to cultivate algae. Progression from the IABR to the 1st CAB depends on achieving specific

targets in the input and production modules to produce fungible fuels at costs that are competitive with comparable petroleum products. Research and development efforts in these areas are on-going at the Las Cruces, NM Pilot Testing Site and will continue at the IABR:

- **Strain improvement:** one of Sapphire's unique strengths is the development of commercial algal strains. Future strains with improved production characteristics will generate greater revenues per acre, decrease production costs, and, consequently, increase the number of economically viable locations on which to produce algal-derived fuel. Sapphire believes that new production strains will be introduced no less frequently than Redacted Exemption 4 .
- **Crop protection:** in order to achieve the productivity necessary meet the techno-economic goals of a CAB, it is essential that loss of algae biomass to contamination by foreign organisms is minimized. Specifically, Redacted Exemption 4 .
- **CO_2 utilization:** for the 1st CAB, Sapphire

  Redacted Exemption 4

).
- **Water lifting and circulation:** Redacted Exemption 4

  The IABR will enable Sapphire to refine its water handling strategies through Redacted Exemption 4 .
- **Dewatering:** Sapphire has overcome the enormous challenge of dewatering large quantities of water by Redacted Exemption 4 .

Other production aspects of the 1st CAB are very similar to the IABR and the scale-up designs are either easily engineered or have strong analogies in other world-scale processes. Major operating components

Redacted Exemption 4

will perform in a similar manner to these other industrial systems.

Sapphire is confident that with sufficient testing at the IABR and its continued, well-funded development efforts in the lab and at the PTS, these targets will be reached and commercial-scale algae production is viable.

3.3. Commercial Algal Biorefinery Construction and Operational Costs

The Historical, Current, Planned Technical and Planned Financial Data spreadsheet, submitted as part of this application, outlines the capital costs for the 1st CAB. Sapphire's financial forecasts show

Redacted Exemption 4

(Refer to the Historical, Current and Financial Data for an explanation on the calculation of these costs).

3.4. Feasibility and Availability of Consumables at Commercial Biorefinery Scale

The Sapphire technology platform uses sunlight, water, nutrients, CO_2, and algae seed as the major inputs. All of these resources are available

Redacted Exemption 4

3.4.1. Water

Adequate water is readily available on the Columbus, NM site in the quantities necessary to produce algae in open ponds.

Redacted Exemption 4

3.4.2. Carbon Dioxide

Redacted Exemption 4

CO_2 is an undesirable waste product for many industrial applications, including power plants producing electricity from coal or natural gas. Concerns about rising atmospheric concentrations of CO_2 have led to an increase in the number of CO_2 capture technologies. However, at present, the economics of capturing CO_2 solely for the purpose of sequestering are extremely unattractive.

Recycling emitted carbon by feeding it to algae reduces the carbon lifecycle of algal-derived fuels by over 50% compared to conventional petroleum.

The IABR will use

Redacted Exemption 4

. Currently, at the IABR, the majority of the CO_2 will come from Praxair, one of the world's leading providers of gas products. Praxair has evaluated Sapphire's IABR plans and CO_2 needs, and has agreed to deliver CO_2 on site for an average cost of $ Redacted Ex. 4 . Sapphire will continue to explore partnerships with Praxair to Redacted Exemption 4 to future commercial scale facilities at the significantly lower costs that the U.S. Department of Energy has targeted for CO_2 capture, transport, and sequestration.

3.4.3. Nutrients

Redacted Exemption 4

3.4.4. Algae seed

Sapphire will develop and produce its own pond inoculums (algae seed stock). The process of seed stock cultivation begins at Sapphire's San Diego research facility,

Redacted Exemption 4

3.5. Methods for Estimation of Capital Construction Costs and Operational Costs

The IABR project will cost approximately $ Redacted Exemption 4 . The first CAB project will cost approximately $ Redacted Exemption 4 Sapphire's engineering partners, Harris Group and AMEC Geomatrix, have significant experience in permitting, engineering, establishing process controls, and sourcing equipment, material, and regional labor from completing constructions similar to the IABR and the CABs. The Sapphire project engineers, Harris Group and AMEC, have an extensive understanding of equipment and material costs based on historical data from similar process design and construction experience. Sapphire's financial projections have been based on GAAP accounting principles. Conservative assumptions in the pricing of products, supplies, and services have been used throughout the forecast period.

3.6. Justification for the Deployment and Commercialization Process

Sapphire has developed a comprehensive method to evaluate the essential elements of a proposed site, select the appropriate commercial algal strain, and perform the required design development for the production. Slight variations in natural resources, such as temperature variation and water quality, influence the catalysis of sunlight into liquid hydrocarbon precursors. Thus, the appropriate matching of site specific resources, commercial strains, and appropriate alterations in the production process is required to optimize each production facility.

Redacted Exemption 4

This process of commercial development follows the proven paradigm of both agricultural production and chemical engineering design and development of unit operations. Sapphire employs subject matter experts in all aspects of this process with a management team possessing 150 years of cumulative experience in technology development and scale-up engineering.

Sapphire intends to streamline the replication process and build CABs throughout the United States,

Redacted Exemption 4

Redacted Exemption 4

Section 10.1 expounds on the Sapphire plan for deployment of CABs.

4. Financial Assurances

Based on its vision, direction, patent portfolio, and strength of management, Sapphire raised more than $

Redacted Exemption 4

Moreover, Sapphire management has extensive prior experience with securing and managing federal funding. Sapphire executives have participated in commercial-scale projects totaling over $100 million, including DOE funding of $38 million for an Integrated Corn Bio-Refinery Enzymes project that was completed satisfactorily and $25 million for a 1/10 scale biorefinery project that is ongoing. The proposed IABR builds on and makes beneficial use of significant prior and ongoing investments. From its San Diego headquarters, Sapphire's management operates research laboratories, algal testing facilities, refining prototypes, and a 22-acre pilot testing site located in Las Cruces, New Mexico. Ongoing operations span California, New Mexico, and Washington, D.C. and

Redacted Exemption 4

The members of the consortium have each provided a letter of commitment to provide services to the IABR. They share a strong track record for implementing commercial-scale projects in their fields of expertise (Refer to Letter of Commitment package submitted as part of this application in the Project Narrative file).

5. Continuity and Continuous Improvement

Sapphire has identified critical R&D required to further improve the technology with the goal of maximizing profitability and minimizing costs. In addition to its ongoing research efforts at its site in San Diego, California and Las Cruces, New Mexico, Sapphire will leverage talent existing in the DOE Federally Funded National Laboratory, Sandia. Table 5 provides a summary of critical R&D activities and anticipated improvements for deployment at the IABR and CABs.

Table 5: Strategy for Continuous Advancements in R&D

R&D Activity	Anticipated Improvement	Team	Delivery Date
Seed stock development Redacted Exemption 4	Redacted Exemption 4	Sapphire	Q4 2011
Modeling of fluid dynamics Redacted Exemption 4		Sapphire and Sandia	Q3 2011

Low cost pond liners using Redacted Exemption 4	Redacted Exemption 4	Sapphire and New Mexico State University	Q2 2011
Nutrient recycling		Sapphire and Ex. 4	Q2 2011
Redacted Exemption 4		Sapphire	Q3 2011

6. Outputs and Business Strategies

Sapphire has brought together a world-class consortium of industrial firms, engineering firms, and construction management. This team is fully capable of managing all of the challenges of project scale-up in line with their core expertise. Table 6 illustrates how the partners' and applicant's core business missions are consistent with the production of fuel and energy across the algae to fuel value chain.

Table 6: Alignment of Sapphire and Partners Business Strategies

Partner	Strategic Business Expertise
Sapphire Energy	• Lead project applicant and IABR operator • Algae cultivation technology holder • Producers of high quality algal oil for conversion to jet fuel and diesel
Redacted Exemption 4	
Dynamic Fuels	• Provider of algal oil refining technology to produce jet fuel and diesel to the IABR • Producers of high quality renewable fuels from agricultural products and non-food grade feedstock (e.g., chicken waste fat and algae)
Harris Group	• Providers of engineering services to the IABR • The pre-eminent engineering group in the development of biofuels in the United States
AMEC Geomatrix	• Providers of civil engineering, permitting, design, procurement and construction services to the IABR • Experts in the execution of large scale projects including biofuel projects (e.g., recently selected to provide services to Range Fuels 1st commercial cellulosic ethanol project)
Praxair	• Supplier of carbon dioxide feedstock to the IABR • World class multinational experts in the delivery of industrial gases • Leading firm in carbon capture from anthropogenic sources
Brown and Caldwell	• Consultants on dewatering technology, water chemistry and civil engineering , to the IABR to achieve economic viability and positive energy balance for algal growth facilitation in ponds and liquids-solids separation for biomass removal

Redacted Exemption 4

7. Business Risks

In recent years there has been a widening gap between production and consumption of oil in the United States, and the gap today stands at approximately 15 million barrels per day. Furthermore, the incongruity between supply and demand worldwide has been expanding. As a result, the global demand for biofuels, especially non-food based fuels, has more than tripled between 2000 and 2007 (*International Energy Agency, F.O. Licht*). Primary drivers for this increase in consumption include the following: volatility in energy supply, limitation of food-based biofuels, reduction in oil production, and industrialization of developing nations, like China and India. Thus, the ability to domestically produce a fungible liquid transportation fuel is more valuable than ever. Nevertheless, Sapphire recognizes the significant business risks associated with its mission and intends to enact a pro-active risk mitigation strategy.

7.1. Challenges to Commercialization

7.1.1. Resources

The primary resources that will be used by Sapphire CABs are land, water, and CO_2.

Redacted Exemption 4

The initial estimation is that land, and a corresponding amount of brackish water, exists in an acceptable economic regime in the region targeted for the production of CABs.

7.1.2. Financial

Following the successful completion of the IABR, the necessary technical information and economic supporting documentation will exist to attract project debt finance for commercial expansion. Sapphire's intention is to

Redacted Exemption 4

Our analysis suggests that there exists

Redacted Exemption 4

7.1.3. Legal

The legal landscape of commercial energy production is complex. Sapphire has invested considerable effort in understanding the environmental, resource use permits, and regulatory framework governing the marketing and sales of liquid transportation fuels.

Redacted Exemption 4

(refer to the Resource Loaded Schedule in the Project Execution Plan on the process for meeting this challenge).

7.1.4. Technical

Demonstration and commercialization of algal oil production is a nascent business that largely builds on the DOE Aquatic Species Program (ASP). Two key conclusions in the final report stand out: 1) production of algal fuel would be economically feasible if oil prices rose above $40 per barrel, and 2) significant advances in the genetics and agricultural nature of algae would be required in order to build and sustain a commercial algal fuel platform. Accordingly, Sapphire has achieved major breakthroughs in advanced genetics of algae for biofuels production (refer to IP statement). Furthermore, key technical challenges Sapphire has identified in its process Redacted Exemption 4 . To meet this challenge, Sapphire has partnered with experts in employing technologies applicable to IABR and CAB that have been proven at commercial scales and tested with algae to meet these challenges economically.

Table 7 and Table 8 present a summary of the risks associated with fluctuations in labor and material and the risks tied to business, market, and environmental uncertainties.

Table 7: Labor and Material Cost Fluctuations

Type	Risk	Risk Mitigation Strategy

Redacted Exemption 4

Redacted Exemption 4

Table 8: Business, Market, and Environmental Risks

Type	Risk	Risk Mitigation Strategy

Redacted Exemption 4

8. Legal and Regulatory Issues

Table 9 presents legal and regulatory risks (refer to the IP Statement for a description of the consortium's owned or licensed intellectual property).

Table 9: Legal and Regulatory Risks

Type	Risk	Risk Mitigation Strategy

Redacted Exemption 4

9. Liability Insurance

No major issues are anticipated with obtaining liability insurance for any aspect of the proposal. The project shares many similarities with established industries, such as oil refining, for which liability insurance is commonly available.

Redacted Exemption 4

), which includes its testing and development site in New Mexico. All required operator and employer insurances, as required by the State of New Mexico and Sapphire Energy's Policies, will be obtained and maintained throughout the operational period of the IABR to protect the asset, Sapphire, and its lenders. Based on Sapphire's experience, it is not anticipated that there will be any impediments to obtaining insurance for larger scale operations. Sapphire will manage responsibility for all liability and damages, including environmental damage, for operations involving biomass production and extraction. Primary responsibility for liability and damages associated with pre-refining, refining, and residual solids operations will be managed by the appropriate partner with Sapphire shouldering secondary responsibility.

10. Product Marketing and Deployment Plan

10.1. Planned schedule for the deployment of the first and subsequent Commercial Algal Biorefineries (CABs)

Figure 1 represents the schedule for deployment of CABs and their current development status, which includes Redacted Exemption 4

The 1st CAB is scheduled to be operational in 2018 and subsequent CABs will be operational Redacted Exemption 4

Figure 1: Schedule and Status for deployment of Sapphire Commercial Algal Biorefineries

Redacted Exemption 4

10.2. Customers for the end products

Oil produced by the IABR and the 1st CAB will be transported to the Dynamic Fuels refinery in Geismar, LA. This represents common practice for petroleum products as the U.S. Gulf Coast refinery complex produces and transports 50% of fuel products refined in the United States. From the Gulf Coast, a nationwide transport, storage, and retail network can deliver fuel products to most of the United States. Algal biomass that remains after the extraction process will be anaerobically digested at the project site.

Redacted Exemption 4

11. Configuration Control

The overall goal of configuration control is to ensure a repeatable process that produces an on-specification product. Product quality will be ensured through a combination of automated process controls and a rigorous quality assurance program. Automated controls and monitoring instrumentation installed on process equipment will ensure that the process runs under constant conditions within tight parameters. The control system will be Redacted Exemption 4

Redacted Exemption 4

Process areas will further be monitored through regular, periodic sampling and inspection. Through continual sampling and monitoring of the process and product quality, a historical link between configurations and product quality can be maintained. A sampling program will be Redacted Exemption 4 . This sampling will enable plant operators and supervisors to ensure continual product quality and to take corrective action as necessary prior to any impact on final product quality.

Before discharging any final product for sale,

Redacted Exemption 4

Changes to the configuration of the plant will be

Redacted Exemption 4

Plant configuration and operations data will be

Redacted Exemption 4

12.Technology and Market Conditions

Despite the fact that algae technology is in its nascent stage, it has gained attention as a feasible liquid transportation fuel in the last 3 years. The market for the end products produced by Sapphire's technology (e.g., fungible jet fuel and diesel) is already established. According to the International Energy Agency (IEA), total worldwide demand for jet fuel is forecasted to reach 7.6 million barrels per day by 2012, compared to 6.8 million barrels in 2007. This reflects a demand growth rate of 2.3% per year.

Redacted Exemption 4

As discussed in Section 7 (Business risks), Sapphire is approaching the market at a time of rapid growth for the biofuels market—demand has tripled in 7 years. Looking further out, the National Petroleum Council study concludes that global demand for energy will grow by as much as 60% by 2030. The factors of price growth, yield, security, and climate change mean that Sapphire is very well positioned in the green jet fuel and green diesel growth markets.

The existing $8-10 trillion petroleum infrastructure will continue to be in existence at the time of commercialization in 2016 and long beyond. Thus, no new infrastructure is needed for end-product distribution. The algal oil will be transported by truck and/or rail at the IABR to the Gulf coast. According to the Federal Railroad Administration, there is an extensive rail network, consisting of 33 regional

railroads for freights alone, that runs throughout the Southwestern United States and links together the states of the Gulf coast.

12.1. Competition from Algae Biofuels Companies

Redacted Exemption 4

Redacted Exemption 4

12.2. Plans for Obtaining Licenses, Certifications, and Standards

In order to commercialize algae-derived jet fuel and diesel

Redacted Exemption 4

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The jet fuel certification process is centered on two areas of concern: deviation from the norm and consistency of product.

Redacted Exemption 4

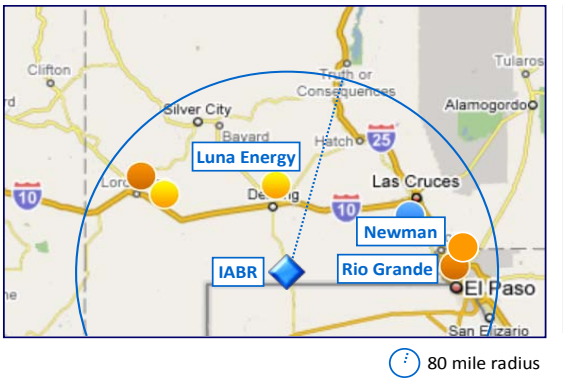
13. Feedstocks for a Full Scale Sapphire Energy Biorefinery

13.1. Feedstock Availability

CO_2 is an acceptable feedstock for commercial production of biofuels as described in Appendix J of this FOA. There are sufficient CO_2 sources within an 80 mile radius of the IABR Redacted Exemption 4 near Columbus, NM. These sources produce 2.4 million metric tons per year of CO_2, an amount that could support the development of up to 170 million gallons per year of algal oil (Figure 3). Future commercial sites are planned

Redacted Exemption 4

Figure 3: CO_2 sources near Columbus, NM



Annual CO_2 emissions	
Power plants	***Mass per year (MT)***
• Newman	1,086,228
• Luna Energy	914,927
• Rio Grande	412,836
Total CO_2 within IABR range	**2,400,000+**

Source: Natcarb.org

13.2. Feedstock Interface with Plant

The interface of this collocation with regards to

Redacted Exemption 4

13.3. Feedstock Source Management

Similar to the IABR, the primary feedstocks for the CABs are CO_2, sunlight, nutrients, and algae seed stock. CO_2 will be delivered to the algal ponds from

Redacted Exemption 4

As explained in Section 3.4, Sapphire does not anticipate issues with seed stock as it produces its own algae seed stock.

Redacted Exemption 4

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13.4. Feedstock Utilization Improvements

Sapphire will

Redacted Exemption 4

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In addition, Redacted Exemption 4 compared to the current forecast in the Historical, Current and Planned Technical and Financial Data file.

14. NEPA and Other Environmental Compliance at a Commercial Biorefinery

Sapphire and AMEC have commenced efforts to evaluate candidate sites for the 1st CAB, taking into account several primary screening criteria. These criteria include:

Redacted Exemption 4

, as well as several other factors. Sapphire understands the complexities associated with a site that the proposed CAB presents (Redacted Ex. 4) with respect to potential environmental, social, and cultural impacts to be evaluated under an Environmental Impact Statement (EIS) within the context of the National Environmental Policy Act (NEPA).

The probable site for the 1st CAB is

Redacted Exemption 4

it is likely an EIS will be required for the project in lieu of an EA (the current expected NEPA outcome for the IABR). The Environmental Questionnaire provides detailed information on the issues under consideration, including water, flora and fauna, wetlands and floodplains, socioeconomic,

demographic, and cultural resources of particular importance in the impact analysis. Table 10 provides a summary of the potential impacts of a CAB and the proposed mitigation strategies.

Table 10: Potential Impact of Scale-up to a Commercial Algal Biorefinery

Potential Impact	Proposed Mitigations

Redacted Exemption 4

14.1. Energy and Environmental Life Cycle Analysis

Sapphire has engaged Redacted Exemption 4 the gold standard consultancy of lifecycle greenhouse gas (GHG) emissions assessment, to assess the GHG intensity of Sapphire's products. Preliminary results indicate that Sapphire's algae-derived biofuel emissions are Redacted Exemption 4 (refer to the LCA section for a detailed discussion).

15. Sapphire Core Competencies and Experience for the Commercial Biorefinery

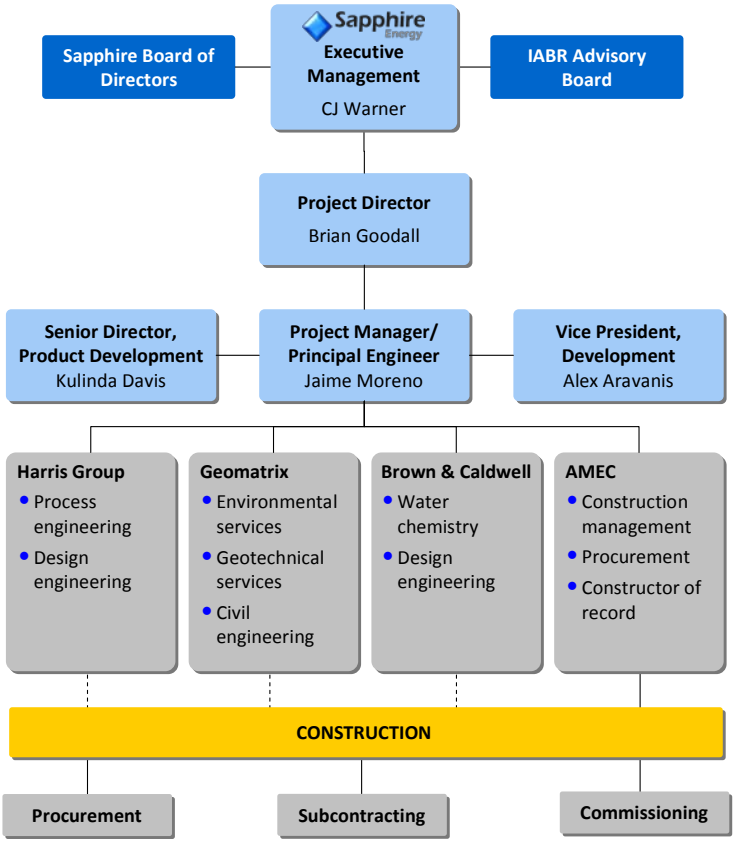
Figure 4 presents the organizational structure of the IABR. The envisioned CAB will build on the core expertise represented within the consortium. Sapphire will rely on the experience of its consortium members, who have extensive experience in the successful scale up and commercialization of new technologies. The consortium brings together the complete value chain from feedstock management;

design, build, and scale up; extraction; refining; and anaerobic digestion. All members of the consortium have experience ensuring good team alignment, sound communication, and team building. Sapphire will lead the development of the communications pathways within the team, between the team, and with outside entities, such as utilities, fabricators, end-users, DOE, etc. Responsibilities and reporting will be assigned to members of the consortium as appropriate.

15.1. Experience and Capabilities of the Executive Team

Sapphire's management team, from the executives to the Board of Directors to the Scientific Advisory Board, has extensive experience in the biofuel and energy industries. Management team members have managed or founded biofuel companies such as Pacific Sun Energy, Green Fuel Technologies, Imperium Renewables, and Pacific Ethanol. Brian Goodall, the IABR Project Director, brings over three decades of experience in petroleum, petrochemical, and biofuel technology development and deployment. As a corporate officer and Sapphire's Vice-President of Technology, Brian will personally oversee the completion of the IABR and the translation of its success into a commercial plant. Sapphire's President, CJ Warner, is directly responsible for Sapphire's commercial operations. She is widely recognized as one of the most experienced and capable operational management executives in the energy industry. In her most recent position as BP's Group Vice President of Global Refining, CJ was directly responsible for operations of BP's entire world-wide refining system, which spanned four continents with over 11,000 employees. Jaime Moreno, the project's Principal Engineer, has over 25 years of experience on more than $10 billion of world-scale engineering projects. A full description of the collective experience of the team can be found in the Resume File.

Figure 4: Project Consortium Organizational Structure



15.2. Commitment of Senior Management

Success of the IABR is considered

Redacted Exemption 4

The commitment, diligence, and discipline of the management team and the owners of the company are high.

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15.3. Key Facilities and Human Resources

Table 11 below presents an overview of Sapphire's facilities that will be used in the development of the IABR and CABs.

Table 11: Overview of Sapphire Key Facilities and Equipment

Facility	Function and Equipment
San Diego Corporate Head quarters and Research Laboratory (12,000 square feet)	Redacted Exemption 4
San Diego Green House Facility (2,500 square feet) 	
Pilot Testing Site in Dona Ana County, Las Cruces, New Mexico (22 acres) 	

ENVIRONMENTAL QUESTIONNAIRE

The data contained in pages 2-15 of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant.

1. Facilities

Sapphire proposes to construct an Integrated Algal Bio-Refinery (IABR) to validate the algae to biofuels process in Luna County, New Mexico. The IABR will be built at a demonstration-scale capable of producing 1.5 million gallons of refined algal oil /annum (100 barrels (bbl) per day). Commercial algal biorefineries (CABs) will be at the scale of 150 million gallons of refined algae oil/annum (10,000 barrels per day). General design parameters for both of these facilities are shown in Table 1**.**

Table 1: General Design Parameters for Demonstration-Scale and Commercial-Scale Algal Biorefineries

Project detail	Units	IABR	1st CAB
Redacted Exemption 4			
Fuel product(s)	-	Diesel and Jet	Diesel

Figure 1 outlines a process and partnership landscape of the IABR. The primary features include a series of ponds

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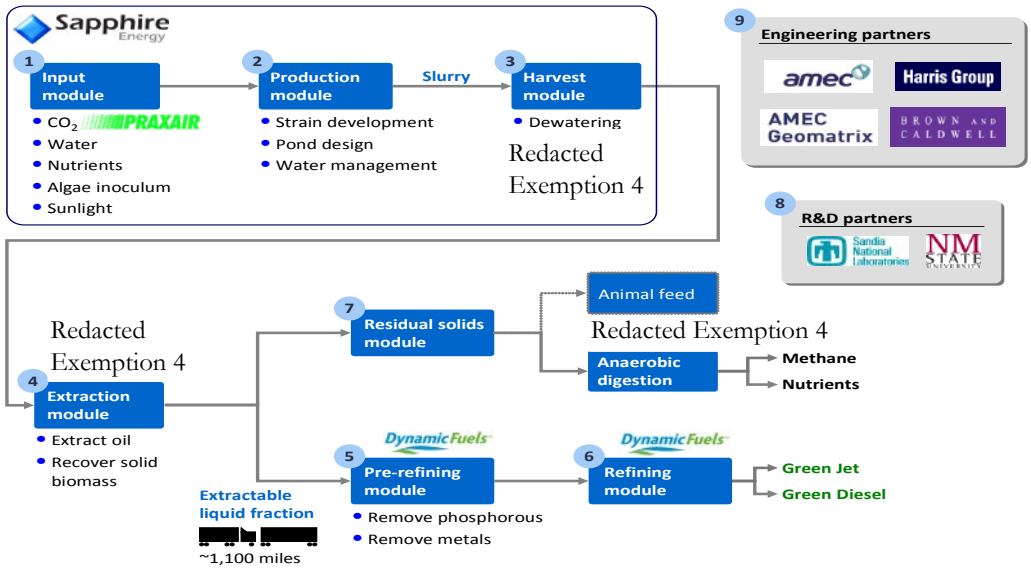
Sapphire's oil generation process at both the IABR and CABs involves distinct process modules: Input, Production and Harvest modules focused on algae growth and harvesting (algae/water separation); Extraction module for oil extraction; and Pre-refining and Refining module for the production of the drop in fuels. All process modules with the exception of Pre-refining and Refining will be located at the site in Columbus, New Mexico. The extracted oil will be sent to Dynamic Fuels, LLC facility located in Geismar, Louisiana for refining. Detailed descriptions of Sapphire process are presented in the PFD and Supporting Data and Project Execution Plan of this application.

The following contains proprietary information that Sapphire Energy requests not be released to persons outside the Government, except for purposes of review and evaluation.

Figure 1: Sapphire's Partners and Process Overview



The IABR ponds and process equipment would be constructed on approximately 400 acres of land. About 300 acres would be cleared for the constructed ponds and another 50 to 100 acres cleared to accommodate processing equipment, an evaporation pond, offices, and a parking area.

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The IABR will front New Mexico Highway 9 and allow for efficient access to the broader commerce area. Highway 9 would likely require upgrading to handle increased traffic. In addition, bordering roads within the facility (including a County road) would be upgraded, as necessary, to promote efficient operation of the IABR. With the exception of construction of an office and associated septic system, no additional significant infrastructure upgrades are anticipated to support development of the demonstration-scale facility.

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No hazardous wastes would be generated by the IABR nor future CABs.

2. Project Location

The IABR will be constructed on land owned by Sapphire in Luna County, New Mexico, approximately 2 miles southwest of Columbus, New Mexico and one-half mile north of the US/Mexico border. The IABR project site is bordered by New Mexico Highway 9 and private land to the north, private land to the west, private and State land to the south, and land owned by two private residents and US Department of Interior Bureau of Land Management (BLM) land to the east. Some of the private land, particularly to the west of the project site, is irrigated, while the majority of the adjacent land is non-irrigated desert.

Currently, Sapphire is

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Luna County, which will host the IABR, is bisected by Interstate 10, which runs east and west, connecting the City of Deming with Las Cruces in Dona Ana County and Lordsburg in Hidalgo County. This route is paralleled by State Highway 549 to the east of Deming and State Highway 418 to the west; State Highway 11 connects Deming with Sunshine and Columbus, New Mexico. State Highway 9 passes east-west along the border with Mexico and serves as the northern boundary of the proposed IABR facility.

The closest rail line to the IABR facility is located in Deming, New Mexico, approximately 35 miles from the IABR site. Other rail routes extend from Deming to the south and another passes along the border with Mexico but these routes have either been dismantled or abandoned.

The IABR site consists of land held in the conservation reserve program (CRP) and was historically irrigated land. Irrigation and agricultural use of the land ceased in 1979. Current vegetation at the site consists primarily of grasses with few shrubs. There are no Class I air quality airsheds within 100 miles of the project site. Sapphire has completed surveys of soils, groundwater, floodplains, cultural, threatened and endangered species, wetlands, and socioeconomic resources for the IABR site. Results of these surveys were presented in a series of technical reports that are available to the DOE, upon request. In summary,

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3. Proposed Project Construction and Operation

3.1. Inputs

Figure 1 shows the IABR process flow chart including inputs and outputs. Materials required for the growth of algae and the production of algal oil include:

Water -- At the demonstration-scale facility,

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Carbon Source -- At the IABR, carbon dioxide will be the source of carbon used to promote algal growth. Carbon would be

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Nutrients --

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Energy Source --

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3.2. Outputs

As mentioned previously, algae oil produced at the IABR will be

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Air emissions expected from the IABR include

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No hazardous wastes are anticipated to be generated at the IABR facilities.

3.3. Operations

The IABR is expected to employ up to 120 workers during the construction phase of the project for up to 12 months. During the operational phase, the IABR is anticipated to employ 30 workers.

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3.3.1. Environmental Impacts

Potential adverse environmental and social impacts associated with construction of the IABR include: (1)

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Mitigation measures developed by Sapphire that would reduce these environmental and social impacts include: (1)

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4. Project Progression

Sapphire intends to begin construction of the IABR in Fiscal Quarter 1, 2010 following completion of a formal Environmental Assessment (EA) according to NEPA regulations and after all necessary permits have been secured. Commissioning and Start-up will commence in March 2011 and full volume operations will

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. The IABR will be used to refine and demonstrate developments in its technology development. Sapphire expects to begin operations of commercial facilities by 2018 and has

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. It is anticipated that the siting study for the commercial-scale facility would be completed by summer 2009 with applicable due diligence, NEPA evaluations, and permitting actions to be completed prior to commencement of construction on the commercial-scale facility would be initiated in the fall of 2015.

5. Status of Environmental and Regulatory Reviews, Including Permitting

5.1. Overview

Several permits are being secured by Sapphire to support development of the IABR in Luna County. To support these permit applications, Sapphire has completed several environmental and social studies and has been in contact with several regulators who administer rules that may be affected by the proposed action. In addition, Sapphire issued letters in early March to various Federal, State, Tribal, and local regulatory agencies, soliciting their counsel regarding their requirements for permits and surveys to support the proposed project

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While not yet initiated, the same permitting issues described below are relevant to the commercial-scale facility. Sapphire understands that many more permitting challenges will be presented for the commercial-scale facility, due to the expanded footprint of the facility, potentially affecting multiple party's (government, private, and Tribal) properties. Sapphire is prepared to initiate broad-scaled environmental, social, and cultural studies that will provide the basis for forthcoming permitting efforts

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5.2. Permitting issues

Water Rights -- Sapphire has purchased the proposed IABR property, including the water rights and onsite wells. Planned repairs to existing wells will require a permit from the Office of the State Engineer (OSE). This permit does not require public notice and has a 5-day turnaround time.

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The State Engineer has verbally informed Sapphire that he will do everything possible to expedite the permitting process, anticipated to require 3 months from the application submittal date.

Wastewater Discharge -- The National Pollution Discharge Elimination System (NPDES) permits required under the Clean Water Act (CWA) §402 NPDES (USC title 33, §1251) are

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. An NPDES permit may be required for the commercial-scale facility should there be such a wastewater discharge.

The State of New Mexico administers a water quality control program under the auspices of the New Mexico Water Quality Act (WQA). According to the New Mexico Environmental Department (NMED), a discharge permit will be required for the anticipated

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A formal permit application will be submitted to NMED in June/July 2009. NMED's groundwater discharge permits have a 5-year term, and require vadose zone monitoring, a closure plan, financial assurance, and inspections (NMAC §20.5.2.3107 (A-E). Public notice is also required (NMAC §

20.6.2.3108). Approximately 180 days are required to get the permit and a permit must be in place prior to operating the facility, but not prior to breaking ground.

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Storm water -- Section 402(p) of the Clean Water Act, implemented by EPA under 40 CFR Part 122.26, addresses municipal and industrial (including construction) stormwater discharges. A Construction General Permit (CGP) will be required for the project because more than one acre will be disturbed. The permit would contain site erosion control and storm water management plans. The CGP would be converted into an operating General Permit once the facility is operational. In addition, a Stormwater Pollution Prevention Plan (SWPPP) and a Spill Prevention, Control, and Countermeasure Plan (SPCC) would also be developed for the facility. Sapphire would acquire these necessary permits upon completion of final design and prior to facility construction.

Wetlands -- Field surveys indicate there are no U.S. Army Corps of Engineers (COE) jurisdictional waters of the US, including wetlands, on the IABR demonstration-scale property. The proposed IABR site generally does not contain swales or depressions that retain water, nor were hydrophytic vegetation identified during field surveying. The floodplain map for the area shows there are no floodplains on the proposed IABR site. Therefore, an individual 404 permit would not be required by the COE for the IABR. A CWA §404 Nationwide 40 (Agriculture) permit may be necessary if Sapphire

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Air Quality -- In accordance with New Mexico's Air Quality Control Act (N.M. Stat. Ann. §§ 74-2-1), enforced by the New Mexico Air Quality Bureau (Bureau), operation of

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The procedure for determining the necessity of a NSR permit requires the applicant to file emissions calculations for review by the Bureau. A No Permit Required (NPR) determination will follow if the facility's potential emissions rate (PER) is less than 10 pounds per hour (pph) and 10 tons per year (tpy) of any regulated contaminant or 1 tpy of lead. If the facility has a PER of less than 10 pph but greater than 10 tpy of a regulated air contaminant, a Notice of Intent to construct (NOI) is required. If the PER is greater than 10 pph and 25 tpy, an air quality permit will be required. In addition, a Clean Air Act (CAA) Title V determination will be made by the Bureau at the time of emission calculation submittals. It is unlikely that the threshold for Title V would be exceeded by operations at the demonstration scale IABR. Sapphire intends to submit emission calculations in the coming months to initiate the Bureau's review and secure air permits, as necessary.

Endangered Species -- There are several regulations protecting flora and fauna of special significance, including the Endangered Species Act (ESA) (7 USC §136 and 16 USC §1531 et. seq.), Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act (BGEPA), and the Endangered Plants Act (EPA) (NM Stat. Ann. §§75-6-1 et. seq. and NMAC 19 Part 21). New Mexico state statutes, NMAC §17.2.37 through 46, aligned with federal regulations, establish that it is unlawful for any person to take, possess, transport, export, process, sell or offer for sale or ship any species of wildlife determined as endangered. Sapphire has contacted the New Mexico Heritage Program and received a listing of species of concern proximal to the proposed IABR demonstration-scale facility, received written correspondence from the USFWS, and completed preliminary field surveys of the project site. The information gathered suggests

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Solid Waste -- New Mexico's Hazardous Waste Act (HWA) and associated regulations (NMAC § 20.4.1) are based on EPA Resource Conservation and Recovery Act (RCRA) definitions and requirements. If the IABR demonstration-scale facility is determined to be an agricultural property, oversight and enforcement of hazardous waste regulations is within the Department of Agriculture purview. If the project is determined to be a non-agricultural facility, enforcement of hazardous waste regulations comes under the authority of the Environmental Improvement Board (EIB) and the NMED. Since no hazardous wastes would be generated from the IABR facility, hazardous waste regulations should not apply. The solid wastes generated from the anaerobic digester

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Cultural Resources -- Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by ACHP. Revised regulations, titled "Protection of Historic Properties," are found in 36 CFR Part 800. In New Mexico, the State Historic Preservation Office ensures compliance with the NHPA.

Impacts to cultural or historical sites are not anticipated with the project, although formal consultations with the State Historic Preservation Officer (SHPO) are not yet complete. A Cultural Resource Survey was completed at the IABR facility during March 2009. Archaeological records maintained at the Archaeological Records Management Section (ARMS) of the New Mexico Historic Preservation Division were consulted and a field survey of the property was completed. The records revealed four previously recorded sites within a 500 meter radius around the project area; however, none of the sites occur on the IABR property. A review of the State Register of Cultural Properties and the National Register of Historic Properties (NRHP) also revealed that no properties on either register are located near the project area.

The archeological field survey of the proposed IABR site identified a series of agricultural ditches and associated features and materials. Artifacts were observed associated with the historic ditch system that serviced the farm. Based on date of construction, the site (ditches and affiliated materials) has a New Mexico Statehood-WWII to recent (A.D 1935 to 1985) affiliation.

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Sapphire has provided a cultural survey report to SHPO and the agency has yet to respond as of the date of this application submittal. SHPO consultation will be completed by Sapphire prior to commencement of any land disturbance activities.

6. Alternative Sites or Operating Parameters

Several alternative locations for the IABR facility were evaluated in arriving at the preferred location in Luna County.

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for minimizing impacts to flora, fauna, water resources, and air quality, and presented a direct opportunity to improve local economic conditions.

Sapphire has developed several alternative designs for the IABR process in both its laboratory in San Diego as well its pilot-scale facility in Las Cruces, New Mexico. The various alternative process designs have all been carefully evaluated

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Sapphire has completed exhaustive research of various technologies in developing the process that will be applied at the IABR. The benefit of the process Sapphire is promoting over other biofuel technologies is that

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The "no project" alternative has also been considered, an alternative that would provide no direct benefit to the local communities in Luna County, the State of New Mexico, or the United States. Opportunities to develop a viable alternative liquid transportation fuel source for the country would be lost under the "no project" alternative and the economic stimulus that would accompany such an enterprise would be forfeited. In addition, advancement of the science and engineering for efficiently and effectively producing green crude would be curbed by not acting on this proposal.

7. Post-Operational Requirements

Sapphire has

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The groundwater discharge permit required by NMED for Redacted Ex.4 requires that a closure plan be developed. In accordance with NMAC §20.5.2.3107(A) (11), the plan is required to guide the approach to preventing exceeding of water quality standards of § 20.6.2.3103 NMAC or mitigate the presence of a pollutant in groundwater after the cessation of operation. This plan must include a description of closure measures, maintenance and monitoring plans, post-closure maintenance and monitoring plans, financial assurance, and other measures necessary to prevent and/or abate such contamination. The obligation to implement the closure plan, as well as abide by the requirements of the closure plan, survives the termination or expiration time of the permit.

As required, Sapphire will submit a closure plan to NMED as its commitment to protect groundwater in the event the IABR facility is decommissioned. Such actions may include

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8. Other Actions in the Project Area

The IABR is

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Currently, Sapphire operates a 20-acre research and development pilot-scale facility in Las Cruces, New Mexico. The IABR in Luna County is the next logical step to developing a replication program for the deployment of full-scale CABs and is essential to achieving Sapphire's goal of Redacted Exemption 4 . To meet this objective, Sapphire's intends to construct and operate a commercial-scale facility capable of producing 150 million gallons annually by 2018.

As mentioned previously, Sapphire has

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Many parts of

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The largest producers of CO_2 in New Mexico include coal-fired power plants and electrical generating facilities. There are sufficient CO_2 sources within an 80 mile radius of the IABR Redacted Exemption 4 near Columbus, NM. These sources produce 2.4 million metric tons per year of CO_2, an amount that could support the development of up to Redacted Exemption 4 . As reported by the Vulcan Project (affiliated with Purdue University), New Mexico emits approximately 17 million metric tonnes of CO_2 annually, with nearly 40% coming from electrical generating facilities. These facilities, along with others elsewhere in the United States, represent viable candidates for CO_2 sources for a commercial algal biorefinery. Sapphire is approaching the need for CO_2 for the commercial facility on two main fronts –

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ENVIRONMENTAL QUESTIONAIRRE

PART I: General Information

Applicant Name: Sapphire Energy Incorporated Proposed Project Title: Integrated Algal Biorefinery (IABR) Solicitation Number: DE-FOA-0000096	Preparer: Kulinda Davis, Ph.D. Phone: (858) 736 1778 Email: kulinda.davis@sapphirefuel.com

1. **Please describe the intended use of DOE funding in your proposed project.**
   Sapphire requests $ 50 million of DOE Funding to assist in the development of an Integrated Algal Biorefinery with budget of $ Redacted Exemption 4 *over 4 years to demonstrate the economic and technical feasibility for producing jet fuel and diesel from algae feedstock.*
2. **Does any part of your project require review and/or permitting by any other federal, state, regional, local, environmental, or regulatory agency?** If yes, please describe. *Refer to the discussion in Section 5 in the Narrative section of the Environmental Questionnaire, above.*
3. **Has any review (e.g., NEPA documentation, permits, agency consultations) been completed?** If yes, is a finding or report available and how can a copy be obtained? *No official NEPA review has been completed regarding the proposed IABR Project. An extensive effort has been completed to compile and analyze existing data and information regarding a host of resource areas potentially germane to the property and which could be used to compile an Environmental Assessment and/or an Environmental Impact Statement under NEPA. In addition, field surveys and on-site environmental data collection efforts have been completed providing site-specific quantification of various environmental resources. This information and data are available to DOE, upon request. In addition, several local, state, and federal agencies that potentially have jurisdiction over certain aspects of the proposed enterprise were consulted to seek their input on requirements they may need addressed or information they may have to offer with respect to baseline conditions at the Project site. Two of the agencies contacts have responded, providing their input regarding permit requirements and potential issues of concern.*
4. **Is the proposed project part of a larger scope of work? If yes, please describe.** *The proposed* IABR *in Luna County is one component of an integrated development plan developed by Sapphire, aimed at developing a commercial-scale facility capable of producing a viable fuel supply that will reduce our country's reliance on foreign oil. The* IABR *project is an outgrowth of laboratory-scale research and development that is ongoing at* Sapphire*'s San Diego laboratory and a field-scale R&D facility in Las Cruces, New Mexico.*

a. **Do you anticipate requesting additional federal funding for subsequent phases of this project? If yes, please describe.** *The total project budget is $* Ex. 4 *, with $50 million from the DOE with* Redacted Exemption 4 *. The IABR is* Redacted Exemption 4

5. **Does the scope of your project <u>only</u> involve one or more of the following:**
   - **Information gathering such as literature surveys, inventories, audits,**
   - **Data analysis including computer modeling,**
   - **Document preparation such as design, feasibility studies, analytical energy supply and demand studies, or**
   - **Information dissemination, including document mailings, publication, distribution, training, conferences, and informational programs.**

The scope of the proposed IABR project includes one or more of the foregoing but goes well beyond these activities to include site development, facility construction, and operations. These components of the proposed project are described throughout this application.

PART II: Environmental Considerations

Section A. Please indicate if any of the following conditions or special areas is present, required, or could be affected by your project.

1. **Clearing or Excavation (indicate if greater than 1 acre):** *Yes.*

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2. **Dredge and/or Fill. Specify the number of acres:**

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3. **New or Modified Federal/State Permits and/or Requests for Exemptions:** *Yes. Refer to discussion in Section 5 of the Environmental Narrative, above.*
4. **Pre-Existing Contamination:** *No*
5. **Asbestos:** *No*
6. **Criteria Pollutants:** *No*
7. **Non-Attainment Areas:** *No*
8. **Class I Air Quality Control Region:** *No.*
9. **Navigable Air Space:** *No*
10. **Areas with Special Designation (e.g., National Forests, Parks, Trails):** *No*
11. **Prime, Unique or Important Farmland:** *No*
12. **Archeological/Cultural Resources:** *No*
13. **Threatened/Endangered Species and/or Critical Habitat:** *Unknown. Preliminary field surveys and regulatory correspondence suggests that critical habitat and T&E species*

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14. **Other Protected Species (Wild Burros, Migratory Birds):** *No*
15. **Floodplains:** *No*
16. **Special Sources of Groundwater (e.g., Sole Source Aquifer):** *No*
17. **Underground Extraction/Injection (non-hazardous substances):** *No*
18. **Wetlands:** *No*
19. **Coastal Zones:** *No*
20. **Public Issues or Concerns:**

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21. **Noise:** *Yes. There will be increased noise during construction and operation associated with increase truck traffic to and from the facility. No consultation or permit is required for the increase in noise and the degree of impact is expected to be minimal.*
22. **Depletion of a Non-Renewable Resource:** *No*
23. **Aesthetics:** *No*
24. **Odor:** *No*

Section B. Would your project use, disturb, or produce any chemicals or biological substances? (i.e., pesticides, industrial process, fuels, lubricants, bacteria)

1. **Polychlorinated Biphenyls (PCBs):** *No*
2. **Import, Manufacture, or Processing of Toxic Substances:**

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3. **Chemical Storage, Use, and Disposal:** *Yes. See discussion of item 2 above.*
4. **Pesticide Use:** *No*
5. **Hazardous, Toxic, or Criteria Pollutant Air Emissions:**

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6. **Liquid Effluent:**

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7. **Underground Extraction/Injection (hazardous substances):** *No*
8. **Hazardous Waste:** *No*
9. **Underground Storage Tanks:** *No*
10. **Biological Materials.** Indicate if genetically altered materials are involved. *No. See discussion in Section D of this form.*

Section C. Would your project require or produce any radiological materials?

1. **Radioactive Mixed Waste:** *No*
2. **Radioactive Waste:** *No*
3. **Radiation Exposures:** *No*

Section D. The following questions are designed specifically to guide applicants who are doing laboratory/bench-scale projects or who will have laboratory work associated with their projects.

NEPA R&D Laboratory Questions

1. Please provide and describe the location of the facility or facilities where lab work will take place. *Lab work will take place at the Sapphire Energy R&D facility in San Diego, California.*

2. What type of safety protocols are in place in the areas where work will take place? Who monitors these? Internally and externally? OSHA standards? *Our San Diego R&D facility follows Good Lab Practices (GLP), and all state and federal safety regulations, including OSHA standards. These are monitored internally and externally by a safety contractor, our landlord, Alexandria Real Estate Equities, Inc. (of San Diego), the city of San Diego, San Diego County, and the San Diego County Fire Marshall.*

3. How are the gases, chemicals, heavy metals, etc... handled, stored and disposed? *All gases and chemicals, including heavy metals, are handled, stored and disposed of according to their MSDS and state and federal regulations. Sapphire contract Advance Chemical Transport (of San Diego) to remove and dispose of chemical waste from our San Diego facility.*

4. What type of safety equipment is in place for the facilities (i.e. fume hoods, alarms, scrubbers, etc...)? *In addition to providing all employees with personal protective equipment, we have fume hoods, biological safety cabinets, eye wash stations, shower stations, fire extinguishers (regular and specialized) and all other safety equipment as required by GLP, OSHA, and state and federal regulations.*

5. What permits are in place for the facility for this type of work? Please list. *Health Permit (County of San Diego), UPF Permit (County of San Diego), EPA ID, Compressed Gas Permit (County of San Diego), and Industrial User Discharge Permit (City of San Diego).*

6. What permits are needed or will be acquired for this type of work? Please list. *All permits for R&D are in place – Sapphire does not anticipate needing any more permits to carry out its R&D activities.*

7. How is liquid effluent handled and discharged? *All liquid effluent is handled and discharged according to city, county, state and federal regulations.*

8. How is toxic waste handled, stored, disposed? *Toxic waste is handled and stored according to state and federal regulations, and we contract Advance Chemical Transport (of San Diego) to remove and dispose of toxic waste from our San Diego facility.*

9. Will the work being done create any air pollutants? If so please explain how these are handled/disposed/mitigated. *No.*

10. Are Genetically Modified Organisms (GMOs) being used? If so please describe how these will be transported, stored, handled and disposed. How are these classified by APHIS, TSCA, and state and local agencies? *According to the federal definition of genetically engineered ("GE") organisms, as discussed in Title 7, Code of Federal Regulations, Part 340 issued pursuant to the Plant Protection Act of 2000, "genetic engineering" refers to the process by which one or more genes and other genetic elements from one or more organism(s) are inserted into the genetic material of a second organism using recombinant DNA techniques".*

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11. Will prototypes be tested in a separate location, if so, please describe the location and answer questions #1-9? *Yes.*

a. **Please provide and describe the location of the facility or facilities where lab work will take place**. *Prototypes will be tested at our pilot facility in Las Cruces, New Mexico.*

b. **What type of safety protocols are in place in the areas where work will take place? Who monitors these? Internally and externally? OSHA standards?** *Our pilot facility follows Good Lab Practices (GLP), and all state and federal safety regulations, including OSHA standards. These are monitored internally by a safety officer, and externally by the city of Las Cruces.*

c. **How are the gases, chemicals, heavy metals handled, stored and disposed?** *All gases and chemicals, including heavy metals, are handled, stored and disposed of according to their MSDS and state and federal regulations.*

d. **What type of safety equipment is in place for the facilities (i.e. fume hoods, alarms, scrubbers, etc...)?** *In addition to providing all employees with personal protective equipment, we have fume hoods, biological safety cabinets, eye wash stations, shower stations, fire extinguishers (regular and specialized) and all other safety equipment as required by GLP, OSHA, and state and federal regulations.*

e. **What permits are in place for the facility for this type of work? Please list.** *EPA ID (for storm water pollution prevention program), discharge permit (New Mexico Environmental Department; permit pending), Occupancy permit (City of Las Cruces).*

f. **What permits are needed or will be acquired for this type of work? Please list.** *Potentially:*

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g. **How is liquid effluent handled and discharged?** *All liquid effluent is discharged to POTW according to their regulations.*

h. **How is toxic waste handled, stored, disposed?** *No toxic waste is produced at the pilot facility.*

i. **Will the work being done create any air pollutants? If so please explain how these are handled/disposed/mitigated.** *No.*

12. Are subcontractors being used for some of the work? If so please answer Questions #1-10 for work being completed by subcontractors. *No.*

LIFE CYCLE ANALYSIS

1. Overview

Sapphire proposes to design, build, and operate a demonstration scale integrated algal biorefinery (IABR) for the production of advanced biofuel that is a "drop-in" replacement for petroleum derived diesel and jet fuel. The Sapphire process produces algal oil that can be refined to fungible fuels, like green jet fuel and green diesel. These products are chemically identical to their petroleum based counterparts, making them entirely compatible with the $8 trillion existing energy infrastructure of refineries, pipelines, gas stations, cars, trucks and jets.

Furthermore, Sapphire's production facilities are scalable and can grow easily from the IABR to Commercial Algal Biorefineries (CABs) as production is based on the proven principals of agriculture and large scale commercially proven processing technologies.

2. Methodology Applied to Sapphire Energy's LCA

The greenhouse gas (GHG) impact of Sapphire Energy's algae-based diesel fuel is compared to petroleum-based fuel on a well-to-wheels (WTW) basis. The functional unit for comparison is a mile travelled based on GREET 2015 timeframe parameters,

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1.1. GREET Algae Shortcoming and Corresponding Solution

The GREET model calculates the GHG impacts of a variety of petroleum and biofuels options but does not include all of the fuel pathway components necessary to determine the fuel-cycle GHG emissions of algae-derived fuels. Therefore, Sapphire hired Redacted Exemption 4 to develop an algae fuel life cycle pathway based on the GREET model and to calculate emissions.

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1.2. Sapphire Fuel LCA Emissions and Production Process

The primary factors in Sapphire's process begin with

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Figure 1: GHG Emissions from Sapphire Algae Diesel, Grams CO_2e per MJ fuel, (kg CO_2e per kg fuel)

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Source: Redacted Exemption 4

The photosynthetic production of algae-derived diesel fuel based on

Redacted Exemption 4

Figure 1: Comparative Life Cycle GHG Emissions per mile driven (well-to-wheels), Grams per mile

Redacted Exemption 4

Reformulated Gasoline	Ultra Low Sulfur Diesel	**Sapphire Algae Diesel**

Source: Redacted Exemption 4

1. Conclusion: Favorable LCA Achieved at High Volumes of Sapphire Fuel Production

Redacted Exemption 4

Graphic Presentations of Fuel-Cycle Energy Consumption and Emissions: Long-Term Technologies

Reductions in Energy Use and Emissions by Vehicle Types (% relative to GVs fueled with RFG)

Redacted Exemption 4

Well-to-Wheels Energy Consumption and Emissions: per Mile

Redacted Exemption 4

Redacted Exemption 4

Example Outputs

Life Cycle Comparisons

Redacted Exemption 4

WTW Comparison with Petroleum

Redacted Exemption 4

Redacted Exemption 4

Redacted Exemption 4

Redacted Exemption 4

LCI Data Matrix, Sapphire Algae

Life Cycle Inventory Data Calculated from GREET

Redacted Exemption 4

Redacted Exemption 4

PETROLEUM DISPLACEMENT ANALYSIS

1. Overview

Sapphire proposes to design, build, and operate a demonstration scale integrated algal biorefinery (IABR) for the production of advanced biofuel, fuels that are "drop-in" replacements for petroleum derived diesel and jet fuel. The Sapphire process produces algal oil that can be refined into green jet fuel and green diesel. These products are identical in properties to their petroleum based counterparts, making them entirely compatible with the $8 trillion energy infrastructure of refineries, pipelines, gas stations, cars, trucks and jets.

Furthermore, Sapphire's production facilities are scalable and can grow easily from the IABR to Commercial Algal Biorefineries (CABs). Production is based on the proven and scalable principals of agriculture and large scale commercially proven processing technologies.

2. Petroleum Replacement Estimate for the Integrated Algal Biorefinery

The anticipated displacement of petroleum that will be achieved at the IABR at 1.5 million gallons per year (100 barrels per day) output is outlined in Table 1.

Table 1: IABR's Energy Impacts in Barrels of Oil in Year 1

Product	Energy content (BTU per L or ft^3)	Annual Output Planned for IABR (L or ft^3)	Annual Output for IABR (BTU)	Equivalent Output (bbl of oil)

Redacted Exemption 4

3. Petroleum Replacement Estimate for 1st Commercial Algal Biorefinery

The anticipated displacement of petroleum at the 1st CAB at 150 million gallons per year (10,000 barrels per day) of algae oil output is outlined in Table 2.

Table 2: CAB's Energy Impacts in Barrels of Oil

Product	Energy content (BTU per L or ft^3)	Annual Output Planned for CAB (L or ft^3)	Annual Output for CAB (BTU)	Equivalent Output (bbl of oil)

Redacted Exemption 4

4. Sapphire Petroleum Replacement Estimate in Ex. 4

Sapphire expects to increase its production levels by opening additional CABs following the schedule illustrated in Figure 1. In Ex.4 alone, Sapphire expects to displace Redacted Exemption 4 as shown in Table 3.

Table 3: Sapphires Energy Impacts in Barrels of Oil by Ex. 4

Product	Energy content (BTU per L)	Annual Output Planned for CAB (L)	Annual Output for CAB (BTU)	Equivalent Output (bbl of oil)

Redacted Exemption 4

Figure 1: Schedule for Deployment of CABs (barrels per day)

Redacted Exemption 4

5. Assumptions

The estimations of IABR and CAB production volume rely on the following assumptions:

Redacted Exemption 4

6. References

The following sources were used to make calculations for production equivalence:

- Energy Information Administration, http://eia.doe.gov/
- Wolfram|Alpha, http://www.wolframalpha.com/

PFD DATA

The data contained in pages 1-27 and both IABR and Commercial Scale PFDs of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant.

Algae Growth (Modules 1 and 2)

1. *How and why was the proposed process chosen? Discuss technical and business risks, benefits and opportunities associated with the process.*

Algae growth in open ponds was chosen because it is a proven, low-cost method for large-scale growth of algae. Environment poses the greatest technical challenge to open pond operation. This challenge has been addressed through careful site selection.

Redacted Exemption 4

2. *Describe the history of research and development performed by the applicant for the proposed process including scale, duration of runs, type of data collected, etc.*

Redacted Exemption 4

Unit Operation # D01 – Input & Production Modules

1. ***Name or title (as shown in the PFD).***

Algae Ponds

2. ***Description of the unit operation.***

1) Capacity and throughput.

Redacted Exemption 4

2) Provide the heat and material balance (H&MB).

Redacted Exemption 4

3) Provide the processing conditions for the unit operation, including temperature, pressure, and residence time.

Redacted Exemption 4

4) Provide designed and actual yield, conversion and efficiency data for each unit operation detailing the products, byproducts, and waste streams.

Redacted Exemption 4

5) Provide the materials of construction and the basis for their selection for each critical piece of equipment.

Redacted Exemption 4

6) Provide the expected service life.

Redacted Exemption 4

7) Describe any known causes and the effects and impacts thereof for system upset and contaminants (including the source(s) of the contaminants).

Ponds are an open environment, much like a farm field, and therefore are subject to contamination by airborne toxins or pathogens. Effects could include decreased productivity or even loss of the algae culture.

8) Provide a description, including physical and chemical composition, phase, temperature and pressure of all input and output streams.

Redacted Exemption 4

9) *Describe the mode of operation, i.e. batch, plug or continuous flow.*

Redacted Exemption 4

10) *For all waste streams leaving the process describe the physical and chemical composition, phase, temperature and pressure, and the proposed method of treatment, storage and/or disposal.*

Redacted Exemption 4

11) *Provide the estimated capital cost of each unit operation and the basis for those costs.*

Redacted Exemption 4

Based upon NREL report "A Look Back at the U.S. Department of Energy's Aquatic Species Program: Biodiesel from Algae," Table III.D.5, page 235, with escalated dollars.

12) *Describe the instrumentation and controls that will be incorporated into this unit. This should complement the instrumentation and controls discussion in the Project Narrative.*

The unit will be controlled by a commercially-available control software system with corresponding instrumentation. This system will allow the plant to run more efficiently and safely than it would without it.

3. Describe the state of technology for the unit operation.

1) If the technology is commercially available, is the proposed design and use within the manufacturer's normal operating parameters?

Yes. The quoted design specifications for the ponds are accepted industry norms. Additionally, pilot testing has been conducted to verify the technology's application.

2) At what scale(s) has the technology been designed and tested? What is the scale-up factor for the proposed unit operation or integration step? (Scale up = proposed facility

unit capacity divided by previous scale capacity.) That is, provide specific explanation and justification for the basis of assumed success in achieving the designed scale up.

Redacted Exemption 4

3) How many runs were made at the stated scale, and for how many continuous hours/days? When (approximately) was the most recent test run?

Redacted Exemption 4

4) *If R&D is the basis for the state of technology, describe the original goals and objectives of the R&D. If not discussed in #3, above, summarize the results of the R&D and discuss how the original goals and objectives were met or not met. Describe the quality and replicability of the results. (If data quality objectives were used to set minimum data quality standards, briefly describe them.)*

The objective of R&D was to apply commercially-available and proven technology to a new application, and demonstrate its efficacy and reliability. These objectives have all been met, and current R&D is focused on integrating the technologies into the overall design.

5) *Is further R&D is needed? Describe the goal and summarize the work needed to obtain the needed information. In lieu of including the information here, if the work is planned to be conducted as part of the project within the scope of this proposal, reference the activity (preferably by WBS number or numbers).*

Redacted Exemption 4

Algae Harvest (Module 3)

Redacted Exemption 4

1. *How and why was the proposed process chosen? Discuss technical and business risks, benefits and opportunities associated with the process.*

The drying process was chosen after pilot studies and consultation with vendors. Each of the technologies selected has been proven at pilot scales and is well-suited to scale-up to higher capacities.

Redacted Exemption 4

2. *Describe the history of research and development performed by the applicant for the proposed process including scale, duration of runs, type of data collected, etc.*

Redacted Exemption 4

Unit Operation # D01 – Harvest Module

1. Name or title (as shown in the PFD).

Redacted Exemption 4

2. Description of the unit operation.

1) Capacity and throughput.

Redacted Exemption 4

2) Provide the heat and material balance (H&MB).

Redacted Exemption 4

3) Provide the processing conditions for the unit operation, including temperature, pressure, and residence time.

Redacted Exemption 4

4) Provide designed and actual yield, conversion and efficiency data for each unit operation detailing the products, byproducts, and waste streams.

Redacted Exemption 4

5) Provide the materials of construction and the basis for their selection for each critical piece of equipment.

Redacted Exemption 4

6) Provide the expected service life.

Redacted Exemption 4

7) Describe any known causes and the effects and impacts thereof for system upset and contaminants (including the source(s) of the contaminants).

Redacted Exemption 4

8) Provide a description, including physical and chemical composition, phase, temperature and pressure of all input and output streams.

Redacted Exemption 4

9) Describe the mode of operation, i.e. batch, plug or continuous flow.

Redacted Exemption 4

10) For all waste streams leaving the process describe the physical and chemical composition, phase, temperature and pressure, and the proposed method of treatment, storage and/or disposal.

Redacted Exemption 4

11) Provide the estimated capital cost of each unit operation and the basis for those costs.

Redacted Exemption 4

Based upon historical vendor quotations for similar equipment.

12) *Describe the instrumentation and controls that will be incorporated into this unit. This should complement the instrumentation and controls discussion in the Project Narrative.*

The unit will be controlled by a commercially-available control software system with corresponding instrumentation. This system will allow the plant to run more efficiently and safely than it would without it.

3. Describe the state of technology for the unit operation.

1) If the technology is commercially available, is the proposed design and use within the manufacturer's normal operating parameters?

Yes. The quoted design specifications for Redacted Ex. 4 are accepted industry norms. Additionally, pilot testing has been conducted to verify the technology's application.

2) At what scale(s) has the technology been designed and tested? What is the scale-up factor for the proposed unit operation or integration step? (Scale up = proposed facility unit capacity divided by previous scale capacity.) That is, provide specific explanation and justification for the basis of assumed success in achieving the designed scale up.

Redacted Exemption 4 The system is well-suited to scale-up.

3) How many runs were made at the stated scale, and for how many continuous hours/days? When (approximately) was the most recent test run?

Pilot tests have been conducted with

Redacted Exemption 4

4) *If R&D is the basis for the state of technology, describe the original goals and objectives of the R&D. If not discussed in #3, above, summarize the results of the R&D and discuss how the original goals and objectives were met or not met. Describe the quality and replicability of the results. (If data quality objectives were used to set minimum data quality standards, briefly describe them.)*

The objective of R&D was to apply commercially-available and proven technology to a new application, and demonstrate its efficacy and reliability. These objectives have all been met, and current R&D is focused on integrating the technologies into the overall design.

5) *Is further R&D is needed? Describe the goal and summarize the work needed to obtain the needed information. In lieu of including the information here, if the work is planned to be conducted as part of the project within the scope of this proposal, reference the activity (preferably by WBS number or numbers).*

Redacted Exemption 4

Ex. 4 Dewatering

1. *How and why was the proposed process chosen? Discuss technical and business risks, benefits and opportunities associated with the process.*

The drying process was chosen after pilot studies and consultation with vendors. Each technologies selected has been proven at pilot scales and is well-suited to scale-up to h capacities. Redacted Exemption 4

Redacted Exemption 4

2. *Describe the history of research and development performed by the applicant for the proposed process including scale, duration of runs, type of data collected, etc.*

Redacted Exemption 4

Unit Operation # D01 – Harvest Module

1. Name or title (as shown in the PFD).

Redacted Exemption 4

2. Description of the unit operation.

1) Capacity and throughput.

Redacted Exemption 4

2) Provide the heat and material balance (H&MB).

Redacted Exemption 4

3) Provide the processing conditions for the unit operation, including temperature, pressure, and residence time.

Redacted Exemption 4

4) Provide designed and actual yield, conversion and efficiency data for each unit operation detailing the products, byproducts, and waste streams.

Redacted Exemption 4

5) Provide the materials of construction and the basis for their selection for each critical piece of equipment.

Redacted Exemption 4

6) Provide the expected service life.

Redacted Exemption 4

7) Describe any known causes and the effects and impacts thereof for system upset and contaminants (including the source(s) of the contaminants).

Redacted Exemption 4

8) Provide a description, including physical and chemical composition, phase, temperature and pressure of all input and output streams.

Redacted Exemption 4

9) Describe the mode of operation, i.e. batch, plug or continuous flow.

Redacted Exemption 4

12) For all waste streams leaving the process describe the physical and chemical composition, phase, temperature and pressure, and the proposed method of treatment, storage and/or disposal.

Redacted Exemption 4

13) Provide the estimated capital cost of each unit operation and the basis for those costs.

Redacted Exemption 4

12) Describe the instrumentation and controls that will be incorporated into this unit. This should complement the instrumentation and controls discussion in the Project Narrative.

The unit will be controlled by a commercially-available control software system with corresponding instrumentation. This system will allow the plant to run more efficiently and safely than it would without it.

3. Describe the state of technology for the unit operation.

1) If the technology is commercially available, is the proposed design and use within the manufacturer's normal operating parameters?

Yes. All vendors are comfortable accomplishing the quoted design specifications for Redacted Exemption 4 Pilot testing of Redacted Exemption 4 have been successfully conducted to verify the technology's application.

2) At what scale(s) has the technology been designed and tested? What is the scale-up factor for the proposed unit operation or integration step? (Scale up = proposed facility unit capacity divided by previous scale capacity.) That is, provide specific explanation and justification for the basis of assumed success in achieving the designed scale up.

Redacted Exemption 4

3) How many runs were made at the stated scale, and for how many continuous hours/days? When (approximately) was the most recent test run?

Redacted Exemption 4

4) If R&D is the basis for the state of technology, describe the original goals and objectives of the R&D. If not discussed in #3, above, summarize the results of the R&D and discuss how the original goals and objectives were met or not met. Describe the quality and replicability of the results. (If data quality objectives were used to set minimum data quality standards, briefly describe them.)

The objective of R&D was to apply commercially-available and proven technology to a new application, and demonstrate its efficacy and reliability. These objectives have all been met, and current R&D is focused on integrating the technologies into the overall design.

5) Is further R&D is needed? Describe the goal and summarize the work needed to obtain the needed information. In lieu of including the information here, if the work is planned to be conducted as part of the project within the scope of this proposal, reference the activity (preferably by WBS number or numbers).

Redacted Exemption 4

Redacted Exemption 4

1. How and why was the proposed process chosen? Discuss technical and business risks, benefits and opportunities associated with the process.

The drying process was chosen after pilot studies and consultation with vendors. Each of the technologies selected has been proven at pilot scales and is well-suited to scale-up to higher capacities.

Redacted Exemption 4

2. *Describe the history of research and development performed by the applicant for the proposed process including scale, duration of runs, type of data collected, etc.*

Redacted Exemption 4

Unit Operation # D01 – Harvest Module

1. Name or title (as shown in the PFD).

Redacted Exemption 4

2. Description of the unit operation.

1) Capacity and throughput.

Redacted Exemption 4

2) Provide the heat and material balance (H&MB).

Redacted Exemption 4

3) Provide the processing conditions for the unit operation, including temperature, pressure, and residence time.

Redacted Exemption 4

4) Provide designed and actual yield, conversion and efficiency data for each unit operation detailing the products, byproducts, and waste streams.

Redacted Exemption 4

5) Provide the materials of construction and the basis for their selection for each critical piece of equipment.

Redacted Exemption 4

6) Provide the expected service life.

Redacted Exemption 4

7) Describe any known causes and the effects and impacts thereof for system upset and contaminants (including the source(s) of the contaminants).

Redacted Exemption 4

8) Provide a description, including physical and chemical composition, phase, temperature and pressure of all input and output streams.

Redacted Exemption 4

9) Describe the mode of operation, i.e. batch, plug or continuous flow.

Redacted Exemption 4

10) For all waste streams leaving the process describe the physical and chemical composition, phase, temperature and pressure, and the proposed method of treatment, storage and/or disposal.

Redacted Exemption 4

11) Provide the estimated capital cost of each unit operation and the basis for those costs.

Redacted Exemption 4

12) Describe the instrumentation and controls that will be incorporated into this unit. This should complement the instrumentation and controls discussion in the Project Narrative.

The unit will be controlled by a commercially-available control software system with corresponding instrumentation. All instrumentation and controls will be provided by

Redacted Exemption 4

3. Describe the state of technology for the unit operation.

1) If the technology is commercially available, is the proposed design and use within the manufacturer's normal operating parameters?

Yes. Multiple vendors are comfortable accomplishing the quoted design specifications. Additionally, pilot testing of multiple Redacted Exemption 4 to verify the technology's application.

2) At what scale(s) has the technology been designed and tested? What is the scale-up factor for the proposed unit operation or integration step? (Scale up = proposed facility unit capacity divided by previous scale capacity.) That is, provide specific explanation and justification for the basis of assumed success in achieving the designed scale up.

Redacted Exemption 4

3) How many runs were made at the stated scale, and for how many continuous hours/days? When (approximately) was the most recent test run?

Redacted Exemption 4

4) *If R&D is the basis for the state of technology, describe the original goals and objectives of the R&D. If not discussed in #3, above, summarize the results of the R&D and discuss how the original goals and objectives were met or not met. Describe the quality and replicability of the results. (If data quality objectives were used to set minimum data quality standards, briefly describe them.)*

The objective of R&D was to apply commercially-available and proven technology to a new application, and demonstrate its efficacy and reliability. These objectives have all been met, and current R&D is focused on integrating the technologies into the overall design and scaling the technology correctly.

5) *Is further R&D is needed? Describe the goal and summarize the work needed to obtain the needed information. In lieu of including the information here, if the work is planned to be conducted as part of the project within the scope of this proposal, reference the activity (preferably by WBS number or numbers).*

Redacted Exemption 4

Ex. 4 extraction (Module 4)

1. How and why was the proposed process chosen? Discuss technical and business risks, benefits and opportunities associated with the process.

The extraction process was chosen after pilot studies and consultation with vendors. Each of the technologies selected has been proven at pilot scales and is well-suited to scale-up to higher capacities.

Redacted Exemption 4

2. Describe the history of research and development performed by the applicant for the proposed process including scale, duration of runs, type of data collected, etc.

Redacted Exemption 4

Unit Operation # D01 – Extraction Module

1. ***Name or title (as shown in the PFD).***

Redacted Exemption 4

2. ***Description of the unit operation.***

1) Capacity and throughput.

Redacted Exemption 4

2) Provide the heat and material balance (H&MB).

Redacted Exemption 4

3) Provide the processing conditions for the unit operation, including temperature, pressure, and residence time.

Redacted Exemption 4

4) Provide designed and actual yield, conversion and efficiency data for each unit operation detailing the products, byproducts, and waste streams.

Redacted Exemption 4

5) Provide the materials of construction and the basis for their selection for each critical piece of equipment.

Redacted Exemption 4

6) Provide the expected service life.

Redacted Exemption 4

7) Describe any known causes and the effects and impacts thereof for system upset and contaminants (including the source(s) of the contaminants).

Redacted Exemption 4

8) Provide a description, including physical and chemical composition, phase, temperature and pressure of all input and output streams.

Redacted Exemption 4

9) Describe the mode of operation, i.e. batch, plug or continuous flow.

Redacted Exemption 4

14) For all waste streams leaving the process describe the physical and chemical composition, phase, temperature and pressure, and the proposed method of treatment, storage and/or disposal.

Algal solids are sent to an anaerobic digester for treatment, where they are converted into a methane-rich gas.

15) Provide the estimated capital cost of each unit operation and the basis for those costs.

Redacted Exemption 4

12) Describe the instrumentation and controls that will be incorporated into this unit. This should complement the instrumentation and controls discussion in the Project Narrative.

The unit will be controlled by a commercially-available control software system with corresponding instrumentation.

3. Describe the state of technology for the unit operation.

1) If the technology is commercially available, is the proposed design and use within the manufacturer's normal operating parameters?

A very substantial development work has been conducted to develop Algae oil extraction process. The process has been repeatedly tested on different scales with a wide range of algae. This testing has provided a credible evidence of a repeatable process, which can be engineered to a much larger industrial scale. This process development exercise has also provided enough knowledge to select industrial equipment, fabrication / construction techniques needed to mature into a robust industrial process.

2) At what scale(s) has the technology been designed and tested? What is the scale-up factor for the proposed unit operation or integration step? (Scale up = proposed facility unit capacity divided by previous scale capacity.) That is, provide specific explanation and justification for the basis of assumed success in achieving the designed scale up.

Redacted Exemption 4

3) How many runs were made at the stated scale, and for how many continuous hours/days? When (approximately) was the most recent test run?

Redacted Exemption 4

4) If R&D is the basis for the state of technology, describe the original goals and objectives of the R&D. If not discussed in #3, above, summarize the results of the R&D and discuss how the original goals and objectives were met or not met. Describe the quality and replicability of the results. (If data quality objectives were used to set minimum data quality standards, briefly describe them.)

The objective of R&D was to apply commercially-available and proven technology to a new application, and demonstrate its efficacy and reliability. These objectives have all been met, and current R&D is focused on integrating the technologies into the overall design.

5) Is further R&D is needed? Describe the goal and summarize the work needed to obtain the needed information. In lieu of including the information here, if the work is planned to be conducted as part of the project within the scope of this proposal, reference the activity (preferably by WBS number or numbers).

Redacted Exemption 4

Algae Oil Hydroprocessing

1. *How and why was the proposed process chosen? Discuss technical and business risks, benefits and opportunities associated with the process.*

The process was chosen to with three objectives in mind, (1) simplicity, (2) scalability, and (3) flexibility. In terms of simplicity and scalability, Redacted Exemption 4 of the petroleum refining and petrochemical industries. They have no moving parts integral to reactor (e.g. agitators) or provisions for direct heat transfer (e.g. heating coils). As such, scale-up principles are well-understood and straight forward.

In terms of flexibility, the process was designed for a wide range of

Redacted Exemption 4

2. *Describe the history of research and development performed by the applicant for the proposed process including scale, duration of runs, type of data collected, etc.*

Redacted Exemption 4

Unit Operation # R1/R2 – Hydroprocessing Reactors

(Redacted Exemption 4)

1. ***Name or title (as shown in the PFD).***

Redacted Exemption 4

2. Description of the unit operation.

1) Capacity and throughput.

Redacted Exemption 4

2) Provide the heat and material balance (H&MB).

Pilot Plant Measurements:

Mass Balance Data from Redacted Exemption 4

Feed Processing Products

Redacted Exemption 4

Mass Balance Data from Redacted Exemption 4(8-hr Operation Basis)

Feed | Processing | Products

Redacted Exemption 4

Mass balances for the commercial process are shown in the PFD/stream tables.

3) Provide the processing conditions for the unit operation, including temperature, pressure, and residence time.

Redacted Exemption 4

4) Provide designed and actual yield, conversion and efficiency data for each unit operation detailing the products, byproducts, and waste streams.

			overall yields	
	HDO	HI	mass [b]	vol [c]
diesel	Redacted Exemption 4			
naphtha				
LPG				
Total				

5) Provide the materials of construction and the basis for their selection for each critical piece of equipment.

Redacted Exemption 4

6) Provide the expected service life.

Redacted Exemption 4

7) Describe any known causes and the effects and impacts thereof for system upset and contaminants (including the source(s) of the contaminants).

Redacted Exemption 4

8) Provide a description, including physical and chemical composition, phase, temperature and pressure of all input and output streams.

Redacted Exemption 4

9) Describe the mode of operation, i.e. batch, plug or continuous flow.

Redacted Exemption 4

10) For all waste streams leaving the process describe the physical and chemical composition, phase, temperature and pressure, and the proposed method of treatment, storage and/or disposal.

Redacted Exemption 4

11) *Provide the estimated capital cost of each unit operation and the basis for those costs.*

Redacted Exemption 4

12) *Describe the instrumentation and controls that will be incorporated into this unit. This should complement the instrumentation and controls discussion in the Project Narrative.*

Redacted Exemption 4

3. *Describe the state of technology for the unit operation.*

1) If the technology is commercially available, is the proposed design and use within the manufacturer's normal operating parameters?

Yes. The equipment specifications are within the range vendors routinely supply to the petroleum refining and petrochemical industries.

2) At what scale(s) has the technology been designed and tested? What is the scale-up factor for the proposed unit operation or integration step? (Scale up = proposed facility unit capacity divided by previous scale capacity.) That is, provide specific explanation and justification for the basis of assumed success in achieving the designed scale up.

Redacted Exemption 4

3) How many runs were made at the stated scale, and for how many continuous hours/days? When (approximately) was the most recent test run?

Redacted Exemption 4

4) *If R&D is the basis for the state of technology, describe the original goals and objectives of the R&D. If not discussed in #3, above, summarize the results of the R&D and discuss how the original goals and objectives were met or not met. Describe the quality and replicability of the results. (If data quality objectives were used to set minimum data quality standards, briefly describe them.)*

Process R&D was used to select catalysts and reactor temperatures/pressures.

5) *Is further R&D is needed? Describe the goal and summarize the work needed to obtain the needed information. In lieu of including the information here, if the work is planned to be conducted as part of the project within the scope of this proposal, reference the activity (preferably by WBS number or numbers).*

Redacted Exemption 4

Anaerobic Digestion

1. *How and why was the proposed process chosen? Discuss technical and business risks, benefits and opportunities associated with the process.*

Anaerobic digestion is a widely-used technique to decompose biomass. Algal solids have been tested to determine their suitability for this process. The biogas released from algal solid digestion is roughly 50% methane, which makes the biogas useable as an energy input to the main process area.

Anaerobic digestion is a fairly standard process. Algal solids are mixed with water to produce a slurry

Redacted Exemption 4

2. *Describe the history of research and development performed by the applicant for the proposed process including scale, duration of runs, type of data collected, etc.*

Redacted Exemption 4

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Redacted Exemption 4

Redacted Exemption 4

PROJECT MANAGEMENT PLAN

1. Table of Contents

1. Project Management Plan Scope

This project management plan applies to all of the activities and operations presented in the Work Breakdown Structure documented within the Project Execution Plan. Sapphire and its consortium will manage the IABR project as outlined within this proposed Project Management Plan. The Stage Gate Process described herein will serve as the structure for evaluating key go/no go decision points throughout the project as work proceeds through the phases.

Sapphire's consortium will include Harris Group, AMEC Geomatrix, Brown and Caldwell and, as Procurement and Construction Manager, AMEC. Three other companies play an important role in the IABR Project: Redacted Exemption 4 is a fluid separation technology partner, Praxair will be the feedstock supplier of CO_2, and Dynamic Fuels is the final refiner.

2. Earned Value Management System

The consortium will follow standard project management principles applied successfully to previous and ongoing technical and administrative contract work, and described in detail in their Project Management Manuals based upon the industry standard "Guide to the Project Management Body of Knowledge" (PMBOK). In addition, best practices, tools, and guidance learned from previous projects will elevate the overall level of project performance

2.1 Planned Project Management Tools

An Earned Value Management System, as a project management tool, will be utilized to provide an ongoing measurement of the actual progress on the work scope, completion cost, and schedule that is compared to the original budgeted performance. The Earned Value (EV) of the work done is quantified as the Budgeted Cost for Work Performed (BCWP). Schedule performance is tracked by comparing BCWP to the Budgeted Cost for Work Scheduled (BCWS) and cost performance is measured by comparing Actual Cost of Work Performed (ACWP) to the BCWP. The EVMS will comply with

requirements outlined in DOE O 413.1A and G 413.3-10. Sapphire's project consortium is experienced with DOE related projects.

The baseline for each of the budgeted items is developed from the Work Breakdown Structure (WBS) which divides the project into distinct manageable elements. The complexity of the WBS varies depending on the complexity of the various project phases. The resources and costs required for each WBS task have been developed as well as the time required for completion of these tasks. The resource estimates and time line form the basis for the EVMS.

A project Gantt Chart schedule has been developed using Primavera P6 ™ software that provides the preliminary baseline total project schedule for this proposal. Working schedules will be implemented and tracked in Primavera P6™ and will be updated on a weekly basis as the project progresses. The resource costs are developed on a weekly basis from data supplied by the accounting system.

On a weekly basis, the project team will review the work completed, the costs of the work, and assesses the work remaining on each WBS task to develop the earned value comparisons for schedule and costs. A trend chart showing the BCWS, BCWP, and ACWP will be updated and a report summarizing the status of the earned value will be issued weekly including project performance indices (CPI, SPI, and TCPI).

The weekly status and trend charts provide an opportunity to take corrective action where required and also provide a method for identifying, approving, and incorporating scope changes that impact the original baseline budgets for cost and schedule.

A monthly status report will be issued that summarizes the activities of the previous month, the cost and schedule status as well as forecast for completion estimates (EAC, LRE, and ETC). The plan for work to be performed in the following month will be included.

3. Invoicing System

3.1 Code of Accounts

Sapphire will use the acclaimed Deltek Vision project management and accounting system, which is currently (June 2009) being installed by the Finance Department in collaboration with Redacted Ex. 4 . The system will be fully operational by July, 2009. Deltek Vision offers a comprehensive suite of project management capabilities, enabling granular tracking of personnel, employee time spent on a particular project, progress and company spending for contractors, status of individual projects, and more. Deltek Vision also enables company-wide tracking of financial data, enabling executives and project managers to generate multiple levels of reports about spending, budgets, and company finances.

Sapphire will use Deltek's accounting software to facilitate project control and management of its project tasks. During construction, Sapphire will align its code of accounts with the construction manager. Detail labor and subcontract costs will be tracked and managed by the construction manager with reporting to Sapphire Project Control. Prior to submittal, invoice details will be verified by project supervising engineers and reviewed with Sapphire Project Management. Detailed backup will be

included with all invoices. The backup will include a summary, labor schedules, supervisory costs, equipment costs, material expenses and other fees. Engineering and Administration costs from other consortium partners will follow similar reporting and invoicing methods.

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Table 1 - IABR Accounts - defines the currently established accounts for the IABR project at this time. The preliminary status of the project is reflected by the simplicity of the current account structure.

Table 1 - IABR Accounts

Sapphire IABR Project Accounts

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3.2 Invoice Approval, Payments, Retention and Final Acceptance

Sapphire will use standard industry practices for receipt and approval of invoices and management of payments and retentions. Invoices received must be accompanied by complete supporting documentation. The invoices will be reviewed by the Engineer to verify accuracy and confirm reported progress. Once approved, invoices will be tracked and paid using the Deltek accounting system.

As part of the approved Construction Schedule, a schedule of progress payments will be included to define the Planned Value progression. This schedule will establish the baseline for the intended project Earned Value progress. The approved invoicing schedule will establish the method of measurements, the milestones and the payment frequencies.

Following standard construction practices,

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. After which point, remaining percentage payments will be made based on completion of deliverables such as final acceptance, receipt of documentation, receipt of warranties and release of waiver(s).

4. Risk Management Plan Summary

4.1.1. Risks Discussion and Mitigation Steps

There are Ex. 4 risks for Sapphire with the IABR project. These risks, however, are identifiable and manageable, and steps have been taken to mitigate these risks where possible.

The risk profile

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4.1.2. Risk Impact Analysis, Quantification

The risks to the project objectives are identified and characterized during a risk assessment work session at the beginning of each project phase. The Project Manager assigns tasks to individuals or small groups to analyze the threats. These individuals estimate the significance of the threats in quantitative terms, prioritize them, and recommend response plans. The Project Manager will review the plans and accept them or have them revised appropriately, and assigns responsible individuals to implement them. During project execution, the Project Manager is responsible for systematic monitoring, with documentation, of the monitoring results to assure that identified risks are being managed according to plan and new risks are identified and managed as well.

4.1.3. Financial & Technical Risks

The ongoing financial risk will be identified through a series of analysis that vary key cost and operational parameters and determine the impact on the financial goals of the project. Refer to example Figure 1: Sample Sensitivity Analysis: Short-term Sensitivity of Cashflow to Key Drivers ($ millions). Items that are determined to have a significant impact on financial goals and are subject to change outside of anticipated parameters will be identified for mitigation. Technical risk is identified through use of a technical project review program which is tracked and managed using the tools described in the following sections.

Figure 1: Sample Sensitivity Analysis: Short-term Sensitivity of Cashflow to Key Drivers ($ millions)

Low case **High case**

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4.1.4. Environmental Risk

The NEPA process will be completed as part of the environmental review process, which evaluates the impacts of the project on each key environmental sector. Any items determined to have potential for significant impact will be added to the risk quantification and management system outlined below. The detailed areas of impact are outlined in the environmental questionnaire section and Project Execution Plan. Sapphire has procured the services of AMEC Geomatrix which has extensive permitting and local experience in the state of New Mexico. Permitting dialog has commenced with the state regarding key elements as part of Sapphire's feasibility study to involve stakeholders as early as possible in the project.

AMEC Geomatrix has performed an extensive due diligence on the property under consideration by Sapphire with the goal to avoid unforeseen conditions at the IABR site which could lead to unpredicted expenses. The exercise has resulted in the selection of the current proposed IABR site near Columbus, New Mexico.

4.1.5. Potential Effect of Environmental & Other Regulatory Project Requirements

Environmental and other regulatory requirements have the potential to impact project cost and schedule. Sapphire has actively engaged the local regulatory agencies, established ongoing dialog and

has identified the key environmental concerns. These will be added to the risk assessment and management system as needed.

4.2 Risk Mitigations Strategies Development & Risk Monitoring

The risk mitigation system includes identifying and analyzing risks, devising response plans, and monitoring and controlling the overall process. Analysis involves assessing the threats to the project objectives posed by specific risks including financial, technical, environmental, and schedule risks. Response plans are specific procedures and techniques employed to reduce the threats. Monitoring will disclose residual risks and identify new ones and is ongoing for the life of the project.

Technical, financial and project staff will review the project on a regular basis and identify key risks. They will use past experience and professional judgment to access a risk level to each item.

A risk management matrix will be developed that outlines each specific risk, ranks it by severity (from high to low) and outlines a mitigation approach. This is tabulated in worksheet format and tracked on a regular interval. Completed items are removed, new items are added and revisions to risk and mitigation are made as required.

The risk management matrix will be routed to key project staff on a monthly basis for review and update. Priority will be given to resolving the highest risk items first.

In addition to regular meetings, the risks to the project objectives will be identified and characterized during a risk assessment work session at the beginning of each project phase. The Project Manager assigns tasks to individuals or small groups to analyze the threats. These individuals estimate the significance of the threats in quantitative terms, prioritize them, and recommend response plans. The Project Manager will review the plans, accept them or have them revised appropriately, and then assigns responsible individuals to implement them. During project execution, the Project Manager is responsible for systematic monitoring with documentation of the monitoring results to assure that all risks are being managed according to plan.

4.3 Risk Documentation

Meeting minutes will be documented from the risk assessment group meetings outlined in Section 4.2 and all risk items will be tracked on the risk management matrix detailed above.

4.4 Sapphire IABR Risks and Mitigation Discussion

The IABR project risks are

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(Figure 2). To mitigate the risk of overruns, Sapphire has partnered with experienced engineering firms and the multinational AMEC to render Construction and Procurement services.

Figure 2: Short-term Technical Risk Shifts to Long-term Market and Operational Risk

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Construction **Ramp-up** **Operation**

Figure 3: IABR Construction Risks

Description of risk	Risk mitigation

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Risks during the IABR ramp-up period are also

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(Figure 4). Sapphire has taken multiple steps to reduce these risks, including:

- Focus on implementing and integrating scalable, well-understood standard pieces of engineering equipment that are being utilized in other industrial settings
- Redacted Exemption 4

- Partner with industry-leading industrial gas companies such as Praxair to ensure CO_2 supply
- Design the process to minimize waste through recycling of nutrients back into the algae ponds
- Design the process to involve few chemical inputs to ensure any waste will be low in toxicity

Figure 4: IABR Ramp-up Risks (1 of 2)

Description of risk	Risk mitigation
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Additional risks during the ramp-up phase are centered on the factors that drive yield, including

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Redacted Exemption 4 (Figure 5). To address these risks, Sapphire is utilizing the following strategy:

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Figure 5: IABR Ramp-up Risks (2 of 2)

Description of risk	Risk mitigation

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Once the IABR facility is commissioned and steady-state operation begins, the project will be subject to several market risks, particularly around Redacted Exemption 4 . Competitive risk will also become more pronounced during the steady-state production state of the IABR (Figure 6). Sapphire is targeting the following as strategies to address operations risks:

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Figure 6: Risks During IABR Operation (1 of 2)

Long-term operation

Description of risk	Risk mitigation

Redacted Exemption 4

Political risks will also become more critical as Sapphire enters the steady-state operation phase. Key policies currently in effect which can have a great impact on the Sapphire business model include the U.S. and World overall biofuel policy, the biofuels mandate in the Renewable Fuels Standard, land-use effects of carbon off-gassing and life cycle analysis, carbon tax and cap and trade legislation, and commercial organism policies. Sapphire is currently executing a targeted approach to educate legislators about the commercial viability and greenhouse gas benefits of algae-derived fuel (Figure 7: Risks During IABR Operation (2 of 2)). Furthermore, Sapphire has enacted the following strategies to avoid risks of detrimental legislation:

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Figure 7: Risks During IABR Operation (2 of 2)

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5. Plans to Accomplish:

5.1 Quality Control and Quality Assurance

The project Quality Assurance Program is based on the Stage Gate process which establishes critical milestones throughout the program. As part of the overall strategy for success, the methodology for assuring quality will establish the key deliverables for each stage and will evaluate them against the overall program goals. At each Stage Gate, the requirements established by the preceding Stage Gate

review are laid forth and are evaluated against their specific performance requirements such as cost, efficiency and productivity. The Stage Gate is a critical go/no-go decision point that determines if the project is able to move forward or requires an alternative approach before proceeding. Stage Gate criterion evaluation will be conducted by Senior Sapphire Staff and independent industry professionals. The deliverables framework for each Stage Gate is outlined in the Project Management Plan.

Sapphire's team will develop the Stage Gate outline provided in Section 9 into defined, quantifiable criteria that will measure the project progress. The established criteria will need to be met before proceeding. At each Stage Gate review, the team will review and establish the criteria for the subsequent Stage Gate.

The Stage Gate approach forms the basis for the Quality Assurance program. It establishes protocols, systems and milestones that drive the project performance. The input from third party industry professionals and experienced senior staff form the frame work for the Control of Quality.

5.2 Start-Up and Testing Post Mechanical Completion

A detailed commissioning plan will be developed for each functional area of the IABR. Each piece of equipment will be initially commissioned by trained startup technicians and/or equipment vendors. All key functions will be tested and individual control loops tuned. Once all unit operations are commissioned and functional, the IABR will begin startup according to the detailed startup operations plan that will be developed.

Equipment specification, design, approval, fabrication, initial shop test, site acceptance, site installation, site testing, and site commissioning will be part of a comprehensive procurement strategy discussed in Section 6.2 Individual pieces of equipment shall be tested in a stand-alone environment and then must be verified in operation as part of their system before accepted and commissioned for operation.

Equipment specifications will include the development of the testing and commissioning plan to ensure that the initial design requirements are understood by all parties involved in the development, construction and installation of the piece of equipment.

5.3 Warranties

Equipment procured as part of the IABR project will be specified with an industry standard warranty of one year from the date of final acceptance. Equipment warranties will warrant the workmanship and performance of the equipment, as specified, for a period of one year and will include the costs of labor and materials for the repair or replacement of the equipment in question. If the supplier is unable or un-willing to correct the warranted condition then Sapphire will perform the work and the Performance Surety will be held liable for the cost thereof.

5.4 Need for Substantial Fix-Ups

In the event that there is a need for significant equipment or process modifications, the consortium are staffed and capable of engineering and constructing any required modifications. The project

construction and commissioning risk will be managed by the use of

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5.5 Debottlenecking

Throughput restrictions associated with a new facility launch are usually associated with a piece of equipment that is underperforming to design specifications. To identify potential problems as early as possible, a pre-performance test plan will be developed to determine the IABR functional capabilities in advance of the formal performance test. Key operating and product quality parameters, along with raw material and utility use will be tracked and compared to process design and pro-forma projections. As-needed adjustments will be made to the process in advance of the formal performance test to ensure all criteria are met. If an underperforming process or equipment piece is identified during commissioning, the Manufacturing Flexibility that will be designed into the equipment specifications will allow simplified post-installation modifications if reconfiguration or servicing is required to meet performance requirements.

5.6 Additional Costs & Schedule Delays

Cost impacts and schedule delays will be closely monitored and tracked using project management and risk analysis tools. Detail tracking and responsive management action to address developing problems will prevent and mitigate potential problems before they present significant problems.

5.7 Securing Additional Resources

The scope of the IABR project is well within the typical project size for the project consortium and its contracting partners. In the event Sapphire needs additional resources for commissioning, increased startup support, equipment retrofit, debottlenecking or other technical requirements, ample resources will be available.

5.8 Contingency Planning

Contingency is developed and managed with a formal planning and reporting process to provide an allowance for unknown events in the project budgeting process and that each project manager maintains the overarching philosophy that contingency is a project resource that deserves focused attention and control. The most successful projects are those where the project is executed without absorbing contingency. There will always be contingent events, but experience has proven that effective management can often mitigate cost impacts leaving contingency as a lower project cost to Sapphire, or for fixed price contracts, an improvement to Contractor's profit margin. A contingency of Redacted Exemption 4 cost estimates as outlined in the Historical, Current and Planned Technical and Financial Data.

5.9 Cost Overruns & Schedule Slippage

The Project Manager and Lead Estimator are responsible for preparing the initial contingency recommendation for review and approval by Sapphire; and they are also responsible for revising the contingency estimate in accordance with the results of the review process. The Risk Management Plan

for the project will be used to identify and mitigate the impact of items that may require additional funds (reference 4.3).

An assessment will be conducted at the end of the Front End Engineering Design (FEL 3), when the scope is frozen – once the site is known, the equipment has been selected, and the configuration of the processes have been settled.

6. Purchasing and Contract Plan Summary

6.1 Acquisition Plan Summary

The acquisition plan for the IABR will be based upon a combination of

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The IABR Stage Gate Process is outlined in detail below. (Section 9: Description of Stage Gate Process for Execution)

6.2 Procurement Strategy

The procurement strategy for the construction of the IABR will be

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Engineering services will be procured through the Harris Group, Brown and Caldwell and AMEC Geomatrix.

Construction Materials represent general construction supplies that do not require specific engineering services to produce and procure. Examples of these materials include conduit, fill for grading and concrete. These materials are usually procured through preferred local subcontractors to produce them through established supply chains suited to the construction location.

AMEC, as the Construction and Procurement Manager will be responsible for the final procurement of all equipment, material and construction services based on the engineering packages developed by the consortium.

Equipment procurement will involve several steps to ensure successful implementation:

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6.3 Procurement & Construction Management Firm

Sapphire has separated the engineering from the procurement and construction activities by assembling a consortium. The consortium provides Sapphire the flexibility to develop its designs but preclude the use of formal EPC style implementation. As the overall process is developed, it is expected that sufficient level of detail will be available to make a procure/construct contract approach the most cost effective. In addition to the role performed by AMEC, the consortium engineering firms will provide construction management and engineering oversight for Sapphire as part of the project during the implementation stages. Sapphire is planning to engage AMEC as the Procurement and Construction Management firm for the IABR project and AMEC will be the Contractor of Record.

7. Plans for Staffing

Sapphire will employ a staff of engineers and administration staff to execute the IABR project. This staff will work with the consortium and the Sapphire Product Development staff to manage the implementation of the IABR project. This staff will report to Sapphire's Vice President of Projects. Table 2 - Staffing Budgets – summarizes the forecast labor expenditures associated with project staffing. Travel and staffing overhead costs are included.

This Sapphire staff along with the staffing requirements for the complete engineering, management and administration of the project are presented below.

Table 2 - Staffing Budgets (thousands)

Sapphire IABR Project Staffing Budgets	Budget

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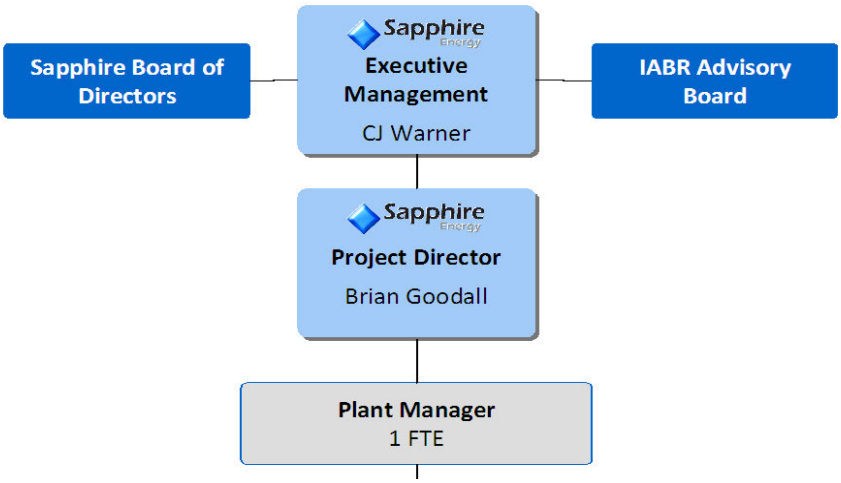
The planned staffing for the operating IABR facility is outlined below. Key individuals such as the Plant Manager will be brought on well in advance of IABR startup to support the construction and commissioning teams. This will provide a knowledge base for transition into IABR operations. The development of operating and management programs and the hiring and training of employees is included in the Work Breakdown Structure.

Figure 8: IABR Operations Management Structure



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(FTE – Full Time Employee)

8. Preliminary Process Hazards Analysis (PHA) Summary

A preliminary process hazards analysis (PHA) will be conducted on the process and instrumentation diagrams as part of the engineering process. The PHA analysis used by Harris Group is the Hazard and Operability Study (HAZOP), one of the six proven methods recognized by the Occupational Safety and Health Administration (OSHA). In this method, the process is broken into individual segments where each process parameter has an identified design intent. Each segment is analyzed to determine

potential deviations from normal operating conditions and recommendations are made to eliminate deviations that pose a risk to operations and/or safety. Harris Group utilizes a software program from

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Recommendations from the PHA will be assigned to a responsible party for developing a design solution and a cost to implement.

8.1 Health & Safety Requirements in the Design Specifications & Cost Estimate

All current and applicable industry standards, codes and best practices will be applied to the design of the IABR Project. It is recognized that Safety, Environmental and other Regulatory requirements must be engineered into the project from its inception to achieve cost effective designs that will not require modification or rework to meet requirements identified in later project stages. These requirements are detailed in the development of specifications in IABR P3.1.1 (Specifications and Standards Development) where design specifications are established before design proceeds. The inclusion of the costs associated with the implementation of Health and Safety requirements have been included into their respective line items.

In order to support the Environmental, Health, and Safety (EHS) Program during construction, safe work behaviors must be integrated daily into best practices on work sites, fabrication, warehousing, and administration facilities. Superior safety performance is attainable with the full commitment and diligent effort of each person within the organization. Workers must commit to their EHS responsibilities for the program to be effective.

8.2 Project Safety Statement

The Sapphire and all project personnel will be committed to providing and maintaining a safe work environment on the project. All project participants will be responsible for conducting work in a manner that ensures the safety of themselves, their coworkers, and the public. The Project Manager will be responsible for establishing safe work practices that identify, evaluate, and control or mitigate unsafe materials, conditions, or acts in the workplace. The consortium commitment is to maintain its industry-leading position for safe performance in both culture and statistics, and to provide a formal, organized, and Integrated Safety Management System (ISMS) on its projects, whereby employees plan, perform, assess, and improve the safe conduct of work through lower-level procedures. This ISMS commitment applies to all levels of work activity and includes environmental, radiological, industrial/chemical, and nuclear safety and health, and encompasses the public, workers, and the environment. The ISMS strictly complies with applicable federal, state, and local regulations, laws, rules, and codes.

8.3 Project Environmental Statement

Sapphire and the project consortium members are committed to being stewards of the environment and executing projects in an environmentally sound and responsible manner. The consortium is committed to knowing and complying with all environmental laws and regulations applicable to the

project and to being socially responsible for preserving and improving the quality of the environment. This commitment is demonstrated by integrating pollution prevention, waste minimization, and resource conservation activities into all aspects of this project.

9. Description of Stage Gate Process for Execution

The stage gate process is a structured approach to the decision making and approval process to ensure that the effort expended to make decisions about the viability of a project are minimized and, upon the decision to proceed with the project, controls are in place to ensure a successful project. The IABR stage gate process includes the following phases. These Phases are identified in the WBS and Project Schedule. Elements of these phases have already commenced in some areas.

Phase 0 - Origination

The initial phase of the project is an internal generation of an idea. This initial phase (FEL-0) includes the following scope:

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A positive review will result in approval to proceed with an investigation of alternatives. A negative review will result in cancellation of the project.

Phase 1 – Conceptual Analysis

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Phase 2 – Process Design

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Phase 3 – Front End Engineering Design

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Redacted Exemption 4

Phase 4 - Implementation

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Phase 5 – Check Out and Startup

Following mechanical completion of the project, the equipment and processes are checked out to confirm readiness to startup, then the start up of the facility proceeds. The following items are considered:

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Phase 6 – Post Project Audit and Reliability

The final phase of the project completes the project documentation and provides an assessment that documents that the project has met the project goals. The following items are considered.

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10. Contracting Strategy

Sapphire has established relationships with the engineering members of the consortium. In addition to these established arrangements, Sapphire has engaged AMEC in discussions to establish a relationship to develop their proposed role as the Construction and Procurement Manager. Letters of intent have been signed by all members of the consortium. These relationships will be the basis for establishing the contracting strategy. The Procurement Manager will be involved in the final design implementation to permit accurate costing data and develop their understanding of the project needs and scope.

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11. Change Control & Configuration Control Management Plan

11.1 Plan & Design Changes during Construction

Initialization of the project execution schedule establishes the base budget. The budget is prepared to a level of detail to ensure adequate activity codes to capture all phases of construction. Accordingly, man-hours will be coded to these activities and field measurable quantities need to be determined to quantify the work to measure performance.

Scope changes may be introduced to the project to encompass new work. The scope change will be quantified and incorporated to the budget by way of change order process. Change Orders to budget will be tracked on a Change Order Log.

Drawing revisions and document issues can contribute to scope change as well. Accordingly, documents will be reviewed and any scope variance will be determined sufficient to raise a Change Order as required. Drawing revisions, documents, and requests for information are tracked as per Artifact Control and referenced to Change Order designations.

Schedule impacts as a result of scope changes or cumulative effects will be quantified and tracked via Change Order process as well.

The Project Performance Report is used to analyze productivity based on

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The Monthly Project Report captures the change management information at a summary level as well as an overview of other related information systems to communicate the overall status of the project to the IABR Project Management Team.

11.2 Start Up Issues and Potential Walk-Away Criteria

Startup issues and required process refinement are normal activities for commercialization of emerging technologies. These can include less efficient operation than projected or product of a lower quality than planned. The process development team will be integral to the commissioning and startup of the IABR and possess the process specific skills to mitigate typical startup issues.

Walk away criteria for IABR is the point at which the process has been unable to operate at projected efficiency and quality, after repeated attempts and no viable plan exists for bringing the IABR into compliant operation. Based upon the extensive front end development work and the stage gate decision making process, it is unlikely this situation will occur.

12. Communication Plan Summary

Engineering and design of the IABR will be performed by Harris Group, Brown and Caldwell and AMEC Geomatrix, with support provided by Sapphire for services dealing with the successful implementation of the proprietary technology. The Program Manager will coordinate all aspects of engineering, construction management and communication. AMEC, as Procurement and Construction Manger will be engaged as the detail design process begins. The communication plan is designed to support the data and documentation requirements of the EVMS.

12.1 Overview of the Mode and Frequency of Communications

A detailed plan will be developed to coordinate communication between the process development, engineering and construction teams to ensure necessary coordination to provide a fully functional project on time and within the projected budget. This is reinforced by the inclusion of the Procurement and Construction firm in the design stages as detail design packages are developed

The proposed project communication system is divided into the following key components. This is based on typical project execution at this scale:

12.1.1. Project Control Systems

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12.1.2. Scheduling

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12.1.3. Construction Work Area Team

For each CWA, the area Superintendent works with the area team consisting of the overall Project Coordinator, the designated quality control and safety personnel, and other discipline-related superintendents as required, to:

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The CWA team will be given appropriate time prior to the start of construction, to prepare the CWA Execution Plan, which will be reviewed with the Project Construction Manager to ensure overall project alignment. If all EWPs are not available during this initial planning process, then as they become available they will be processed as above, and incorporated into the CWA Execution Plan.

On a weekly basis, the CWA team will be measured and held accountable for:

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12.1.4. Installation Work Area Team

Once each EWP has been broken down into discipline based packages and assigned to each General Foreman, the General Foreman and the area team develops Installation Work Packages (IWPs) for each Foreman. The General Foreman has a designated Area Coordinator, but can also call on the services of overall project scaffolding, equipment, and material coordinators. IWPs are assembled and given to the Foreman 1-2 weeks prior to the work being started, and will only be issued once all scaffolding, material, equipment, manpower, permits, etc. are available, and the foreman can reasonably be expected to achieve a productivity of one or higher. Typically the Area Coordinator will have had sufficient experience to allow him/her to have done the job.

12.1.5. Three Week Look Ahead Plan

As the IWPs are given to each Foreman, the Foremen and General Foreman together prepare the Three Week Look Ahead Plan (actually one week back and three weeks forward) for each IWP, and update them each week. Although the CWA superintendent reviews them on a weekly basis, they are primarily to be used as a first-line planning and progress-monitoring tool.

The Three Week Look Ahead plan shows for each IWP:

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12.1.6. Weekly Deliverables to CMT

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12.2 Key Functions Roles/Responsibilities

The proposed organization for this project consists of three major teams, all with specific responsibilities.

- **Project Management Team (PMT)**: Consists of a joint group made up of Sapphire and the consortium. This team is responsible for overall execution of the engineering, procurement, construction, and commissioning phases of the project.
- **Engineering Management Team (EMT)**: Reports directly to the PMT and is responsible for the scope development, preliminary and detailed engineering phases, as well as procurement of equipment and permanent materials.
- **Construction Management Team (CMT)**: Reports directly to the PMT and is responsible for all activities at the work site including the construction execution and the commissioning of the unit. The CMT understands that successful projects involve advanced planning, scheduling, and risk mitigation and will be involved in the constructability reviews during the detailed engineering phase of the project.

Project role descriptions are described below and show the personnel that will be placed on the construction portion of the project. An overview of the responsibilities for each key group is also included for information.

- **Project Senior Management**: Consists of Construction Manager and General Superintendent and supported by the home office Construction Manager. The project senior management staff is responsible for the overall safe completion of the project and meeting project quality, safety, cost, and schedule objectives. On a day-to-day basis, they are accountable to provide leadership and direction to the project team, and interface with the engineers and owners on issues of project performance.

- **Administration**: Responsible for ensuring that all project hiring, payroll, billings, and human resource issues are expedited and completed within a timely manner. Administration supports other departments with clerical and other administrative functions as needed.
- **Field Engineering**: Responsible for the technical aspects of the project and ensures that engineering change, deviation, or technical procedures are executed and delivered with scope and contract of the project. The function of this group also includes

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- **Quality Control**: Responsible for completing quality control functions to ensure that completed construction meets regulatory requirements, code and Sapphire specifications, procedures and standards.
- **EHS Group**: Ensures that the consortium as well as Sapphire specific site policies and procedures are adhered to. The EHS Group is responsible for

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- **Construction**:

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  Construction works within the scope and mandate of the Baseline Schedule.
- **Pre-Commissioning/Commissioning Support**: Provides support to the start-up team to ensure safe biorefinery start-up. These activities are done in conjunction with Sapphire Operations personnel. Commissioning primarily receives direction from Sapphire operations specialists and supports all start-up activities. Work is executed utilizing construction and quality control resources.

U.S. Department of Energy
Generic Pro-Forma

Form Revision 1

Name of Applicant Sapphire Energy Inc
Name of Facility Integrated Algal Biorefinery (IABR)
Independent Engineer 1/20/2012 (note: first operation occurs on 10/3/2011)
Facility Capitalized ($ Redacted Exemption 4

Projected Operating Results

Federal Fiscal Year Ending September 30	2012	2013	2014	2015	2016
PERFORMANCE					
	Redacted Exemption 4				
COMMODITY PRICES					
	Redacted Exemption 4				
OPERATING REVENUES					
	Redacted Exemption 4				

U.S. Department of Energy
Generic Pro-Forma

Form Revision 1

Name of Applicant Sapphire Energy Inc
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Facility Capitalized ($ Redacted Exemption 4

Projected Operating Results

Federal Fiscal Year Ending September 30	2012	2013	2014	2015	2016
OPERATING EXPENSES					

Redacted Exemption 4

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Facility Capitalized (	$ Redacted Exemption 4

Projected Operating Results

Federal Fiscal Year Ending September 30	2012	2013	2014	2015	2016

Redacted Exemption 4

U.S. Department of Energy
Generic Pro-Forma

Form Revision 1

Name of Applicant	Sapphire Energy Inc
Name of Facility	Integrated Algal Biorefinery (IABR)
Independent Engineer	1/20/2012 (note: first operation occurs on 10/3/2011)
Facility Capitalized (	$Redacted Exemption 4

Projected Operating Results

Federal Fiscal Year Ending September 30	2012	2013	2014	2015	2016

Redacted Exemption 4

Notes:

(1) Units should be converted to match between Performance and Pricing sections
(2) Cells in Green should be manipulated per applicants pricing or other assumption information
(3) Text in Blue should be modified to match applicants names, units, etc.
(4) Grouped rows, for example product transportation pricing, may be rolled up after data entry to simplify pro-forma output
(5) Applicant may manipulate spreadsheet to incorporate pertinent information not included in standard form

U.S. Department of Energy
Generic Pro-Forma
Form Revision 1

Name of Applicant	Sapphire Energy Inc
Name of Facility	Sapphire Commercial Algal Biorefinery (CAB)
Commercial Operation Date	10/1/2017
Facility Capitalized Const Cost	$Redacted Exemption 4

Projected Operating Results

Year Ending September 30th	2018	2019	2020	2021	2022
PERFORMANCE					
Redacted Exemption 4					
COMMODITY PRICES					
Redacted Exemption 4					

U.S. Department of Energy
Generic Pro-Forma
Form Revision 1

Name of Applicant	Sapphire Energy Inc
Name of Facility	Sapphire Commercial Algal Biorefinery (CAB)
Commercial Operation Date	10/1/2017
Facility Capitalized Const Cost	$ Redacted Exemption 4

Projected Operating Results

Year Ending September 30th	2018	2019	2020	2021	2022
OPERATING EXPENSES					

Redacted Exemption 4

U.S. Department of Energy
Generic Pro-Forma
Form Revision 1

Name of Applicant	Sapphire Energy Inc
Name of Facility	Sapphire Commercial Algal Biorefinery (CAB)
Commercial Operation Date	10/1/2017
Facility Capitalized Const Cost	$ Redacted Exemption 4

Projected Operating Results

Year Ending September 30th	2018	2019	2020	2021	2022
Redacted Exemption 4					
DEBT SERVICE					
Redacted Exemption 4					

Notes:

(1) Units should be converted to match between Performance and Pricing sections
(2) Cells in Green should be manipulated per applicants pricing or other assumption information
(3) Text in Blue should be modified to match applicants names, units, etc.
(4) Grouped rows, for example product transportation pricing, may be rolled up after data entry to simplify pro-forma output
(5) Applicant may manipulate spreadsheet to incorporate pertinent information not included in standard form

PROJECT NARRATIVE COVER SHEET
Recovery Act – Demonstration of Integrated Biorefinery Operations
Funding Opportunity Announcement Number: DE-FOA-0000096
CFDA Number: 81.087 Renewable Energy Research and Development

Applicant Information	
Applicant Name:	Sapphire Energy Inc
Project Title:	Sapphire Integrated Algal Biorefinery (IABR)
Major Project Subcontractors:	AMEC Geomatrix, Harris Group, Ex. 4 and Dynamic Fuels
Major Project Vendors:	
Key Individuals:	Jason Pyle, Kulinda Davis, Brian Goodall

Topic Area (Select ONLY one)

Each applicant is allowed to submit only one application to this FOA. Applicants that submit to none or more than one topic area will be excluded from further review. Select one and only one topic area below.

☐ Topic Area 1	✓ Topic Area 3	☐ Topic Area 5
☐ Topic Area 2	☐ Topic Area 4	☐ Topic Area 6

Lifecycle Greenhouse Gas Emissions Reduction (mandatory for Topic Areas 5 and 6. Important – See Note): 68**%**

Technical Description		
Feedstock(s):	Anthropogenic and Atmospheric Carbon dioxide	
Primary Product:	Algae Crude Oil that will be refined to Jet Fuel and Diesel	
Co-Products:	Biogas and/or Animal Feed Protein Product	
Location of Proposed Facility:	Columbus, NM	
Throughput of Proposed Facility (dry tonnes of feedstock per day):	56 tonnes Carbon Dioxide	
Conversion Technology:	☐ Biochemical	☐ Thermochemical
	✓ Algae	☐ Other (Describe)

Short Description: Sapphire Energy proposes to build an integrated algal biorefinery utilizing 56 metric tonnes of CO_2 to produce 1.5 million gallons of refinable algae crude oil per day. The algae crude will be refined to jet fuel (in the first year only) and diesel in subsequent project years. The fuel end-products will be chemically identical to petroleum based fuels.

Project Financing Description

50% Minimum required cost share (%) for the selected topic area.	Ex4% Applicant's cost share (%)	$50,000,000.00 Minimum required cost share ($) for the selected topic area. (See FOA, Appendix C for the calculation method)	$ Redacted Exemption 4 Applicant cost share ($, from SF-424a, box 5(f))

$ Redacted Ex. 4 - Total Allowable Cost (Total Project Cost, from SF-424a, box 5(g))

This form is required. It must be completely filled in and be included as the cover page for the "Project Narrative" (FOA, Subpart IV.C. b.). This form may contain confidential /business proprietary information IF it properly marked, but it must not contain any Personally Identifiable Information (PII). This form will count toward the page limit stated in the FOA, Subpart IV.C.b. Non-compliant applications will not be reviewed and will not be eligible for selection.

Note: The Energy Independence and Security Act of 2007 ("EISA") requires that the Secretary of Energy shall not make an award to a project that does not achieve at least an 80 percent reduction in lifecycle greenhouse gas emissions.

PROJECT NARRATIVE

1. Table of Contents

2. Abbreviations

CAB – Commercial Algal Biorefinery (150 million gallons/year of algae oil capacity)
IABR – Integrated Algal Biorefinery (The proposed project at 1.5 million gallons /year algae oil)
HDO - Hydrodeoxygenation
HRJ – Hydrotreated Renewable Jet
PTS – Pilot Testing Site (Sapphire's pilot testing site located in Las Cruces, New Mexico)
WBS – Work Break down Structure

1. Project Goal and Objectives

1.1. Project Overview

The overall goal for the proposed Integrated Algal Biorefinery (IABR) project is to demonstrate that the algal oil to biofuel process scales with favorable economics. Sapphire Energy (Sapphire) has already successfully demonstrated that algal oil can be converted to gasoline, diesel and jet fuel as verified by fuel specification associations. On January 7, 2009, Sapphire participated in the first flight ever to use synthetic jet fuel made from algae with its partners, Boeing, Continental Airlines, and UOP. A 2-engine 737-800 successfully completed a two-hour test flight. Engine 1 used conventional petroleum-based jet

fuel and engine 2 used 50% conventional fuel and 50% synthetic jet fuel (blend of algae- and jatropha-derived spec jet fuel). Engine 2 performed perfectly and burned 3,600 pounds of the 50-50 jet fuel-biofuel mix. Engine 1 burned 3,700 pounds of traditional jet fuel, implying that the synthetic blend was somewhat more efficient. This flight was a milestone event for several reasons, not the least of which stems from the fact that, just one year earlier, skeptics claimed it was chemically impossible to make synthetic jet fuel from algae.

The initial goal of Sapphire was to build on the success of the 17-year Department of Energy Aquatic Species Program (ASP), conducted between 1979 and 1996. Two key conclusions of the ASP final report stand out:

1. production of algal fuel would be economically feasible if oil prices rose above $40 per barrel, and,
2. in order to build and sustain a commercial algal fuel platform, significant advances in the genetics and agricultural nature of algae would be required.

In addition to being in alignment with the President's stated goal of a reduction of 10 million barrels per day in foreign oil consumption by 2030, the proposed IABR project is a critical step in Sapphire' s development.

Sapphire proposes to design, build, and operate the IABR for the production of advanced biofuels that are "drop-in" replacements for petroleum-derived diesel and jet fuel. At the IABR, Sapphire will cultivate its advantaged (i.e. selected and bred to improve desirable characteristics) strains of microalgae to produce algal oil and refine it into advanced biofuels. Table 1 presents a summary of facts about the IABR.

Table 1: IABR Quick Facts

Project detail	Units	IABR	1st CAB
Project Capital Costs		Redacted Exemption 4	
Algal growth unit operation			
Number of growth units			
CO_2 capture			
CO_2 utilization			
Extractable oil fraction			
Algal oil	million gallons/annum	1.5	150
Fuel product(s)	-	Diesel and Jet	Diesel

The aim of the IABR will be to:

- Deploy the algae-to-green fuels process at the pre-commercial scale
- Integrate the key processes from feedstock to transportation fuel
- Continue to reduce capital and operational costs

Technical and operational data from Sapphire's Pilot Testing Site (PTS) in Las Cruces, New Mexico provide the design basis for building and operating the IABR.

Sapphire has demonstrated the entire pond-to-pump (sunlight–to-fuel) value chain at pilot scale by producing jet fuel with its refining partner Dynamic Fuels. Algal biomass was grown and harvested at the PTS and the algal oil was extracted Redacted Exemption 4 . This oil was refined using the Dynamic Fuels Bio-Synfining™ process to produce on-specification diesel and jet fuel (Hydrotreated Renewable Jet, HRJ).

Redacted Exemption 4

This pond-to-pump demonstration confirms that algae oil extracted from algal biomass grown at Sapphire Energy's pilot production and IABR site in New Mexico is well suited for conversion into iso-paraffinic diesel and jet fuel meeting or surpassing all specifications (Table 2).

Table 2: HRJ Properties from Sapphire Energy Algae Oil and Conformance to Commercial (Jet A-1) and Military (JP-8) Specifications

Property	Units	ASTM D 1655 Jet A-1	MIL-83133E JP-8	Bio-Synfined HRJ from Sapphire Energy Algae Oil

Redacted Exemption 4

1.2. Project Specific Objectives

The overall goal of the Sapphire Integrated Algal Biorefinery (IABR) is to demonstrate that the algal oil to biofuel process scales with favorable economics. By commencing construction in 2010 and spending $ Redacted Exemption 4 . The overall objective of the IABR is to demonstrate the technical and economic feasibility of the algae to green fuels (e.g. jet-A, ASTM –certified diesel) process that will form the basis for the development of a series of commercial scale biorefineries (CABs). The IABR will realize the following objectives:

- Design and Construction: All infrastructure, including equipment, design and control methods, for the production of algal oil for green jet fuel and green diesel

- Shakedown and Testing: Material and energy flows for all process inputs and product flows and compare different process operating conditions; product flow rates and yields from different commercial algal strains against model projections
- Steady-state Operations: Material and energy balances; plant process design, including operating conditions, cash flow and capital requirements for a full-scale commercial plant capable of producing greater than 150 million gallons of algae oil per year (10,000 bpd)
- Commercialization: A replication program to construct and operate full-scale commercial algal biorefineries (CABs) throughout the Southwest United States and beyond

1.3. Sapphire Process Critical Success Factors

Sapphire has already demonstrated the most important critical factor for success for the IABR: a complete sunlight-to-fuel process validation of all unit operations with an associated economic analysis (refer to the Historical, Current, Planned Technical and Financial data for a summary analysis). Each unit operation was advanced through concept and feasibility testing before being piloted in continuous operations. Demonstration of integrated process capability is a critical factor in any demonstration scale-up.

Critical success factors for progression from the IABR to the 1st CAB depends on achieving specific targets in the input and production modules to produce fungible fuels at costs that are competitive with petroleum products. Research and development efforts in these areas are on-going at the Las Cruces, PTS and will continue at the IABR:

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Redacted Exemption 4

Sapphire is confident that with sufficient testing at the IABR and its continued, well-funded development efforts in the lab and at the PTS, these targets will be reached and commercial-scale algae production is viable. Sapphire's competitive advantages are discussed below.

1.4. Competitive Advantages

1.4.1. Sapphire Employs Advantaged Algae Strains Developed For Commercial Use

There is little precedent for the use of wild organisms in very large scale commercial agricultural production. All world-scale agriculture utilizes genetically advantaged organisms developed specifically to thrive in the commercial environment. While certain kinds of organisms can be grown at great expense for specialty markets (e.g., strawberries, avocados), they cannot be produced at the world-scale as an agricultural staple. In order to produce algal fuel products at commodity energy prices, algae production must mimic the robustness and cost structure of Redacted Exemption 4

Therefore, a main focus of the PTS, and a critical success factor for proceeding to the demonstration scale, is the performance validation of Sapphire's commercial algae strains.

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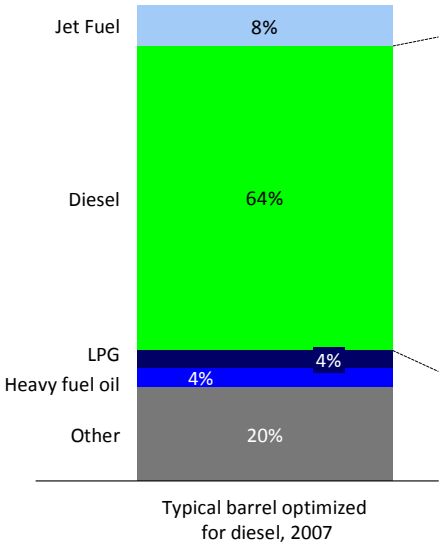
1.4.2. Sapphire Produces Fungible Fuels Compatible with the Existing Petroleum Infrastructure

The United States has invested more than $10 trillion in infrastructure for the movement, processing, storage, distribution, and use of gasoline, diesel, and jet fuel. The end-products from Sapphire's process are "drop in" fuels that are indistinguishable from existing gasoline, diesel, or jet fuels. The advantage of Sapphire's approach is that no alteration to the existing refining, distribution, or consumption activities is required to address the national challenges of climate change and energy security. Furthermore, as a crude oil, algal oil is superior to the average petroleum barrel in its useful fuel fraction. Because Sapphire algal oil yields

Redacted Exemption 4

Redacted Exemption 4

Figure 1: Diesel Yield from a Typical Barrel of Crude Oil



Redacted Exemption 4

Source: EIA

1.4.3. Sapphire is a Complete Energy Solution from Feedstock Production to the Fuel End-Product

Making liquid fuel requires two essential ingredients: carbon and energy. The majority of other biofuel approaches use sugars for both of these needs. In this sense, they are refining businesses, in that they refine one commodity product (sugar) into another commodity product (fuel). Furthermore, such processes not only compete with other industries (e.g., the food industry), but they often refine food products into non-fungible fuel products (e.g., ethanol and biodiesel) which are not seamless replacements for petroleum or petroleum products. Algal oil production differs significantly from this "refining" process because it uses inorganic carbon (CO_2) and sunlight as the source of carbon and energy, respectively.

Integrated algal biorefineries (IABRs) utilize a pond-to-pump model: algae produce their own refining feedstock by harnessing solar energy, CO_2 from anthropogenic and atmospheric sources, non-potable water, and a limited quantity of nutrients. The algal oil is extracted and processed directly into transportation fuel using traditional refining technology. Sapphire's scalable production facilities can grow easily and economically because production is based on the proven principals of agriculture. Each 150 million gallon per year CAB will displace 0.06% of U.S. fuel consumption. The area of corn production used for ethanol is currently 23 million acres and produces 4% of U.S. transportation fuel consumption. By comparison, the same land area used for algal cultivation would yield over 40% of U.S. transportation fuel.

1.5. Sapphire's Value Proposition

The Sapphire IABR has been carefully planned to address the demands of our time (Table 3).

Table 3: Stated Goals of IABR Relative to Important Stakeholders

Stakeholder	Goal	IABR Proposal
President Obama	Reduce U.S. imports of foreign oil by 10 million barrels per day	• Project with clear scalability to exceed 1 million barrels per day of domestic fuel production (15 billion gallons/year)
American Recovery & Reinvestment Act of 2009	Stimulate U.S. economy Create sustainable jobs	• All IABR costs and revenues will flow directly to U.S. businesses and jobs • Immediate jobs: 30 • New 'green collar' jobs by 2030: more than 16,000
DOE Energy Efficiency and Renewable Energy Program (EERE)	Reduce or end dependence of foreign oil Spur the creation of a domestic bio-industry	• Development of a fundamentally new and widely scalable bio-industry that does not compete with existing resources or markets

Furthermore, Sapphire's algae oil will address the five primary unmet needs of the U.S. transportation fuels market (Table 4).

Table 4: Sapphire's Fuel Addresses Unmet Needs in the U.S. Transportation Fuels Market

#	Unmet Needs	How Sapphire's Biofuels Addresses These Needs
1	Fuels that are 100% "drop in solutions"	• Compatible with existing oil and fuel movement infrastructure (e.g., pipelines, terminals) • Compatible with existing refining infrastructure • Compatible with existing fleet of land and air vehicles (e.g., cars, trucks, jets)
2	Fuels derived from feedstocks that do not compete with current agricultural land or water	• Uses no agricultural products already in use • Uses marginal land
3	Fuels with a favorable CO_2 life cycle when compared to conventional petroleum	• Completely renewable • Consumes CO_2 from atmospheric and anthropogenic sources (e.g., coal plants) • No indirect land use issues • At least 50% lower lifecycle emissions than gasoline
4	Fuels that can be produced domestically and that can compete in price with petroleum	• Located throughout the Southwest U.S. and beyond • Produced at target cost < $80 per barrel
5	Fuels that can be scaled to meaningfully displace petroleum sources	• Scalable to > 1 million barrels per day in the U.S.

In addition, the project will address the 5 key barriers to biofuel commercialization identified by the DOE National Biofuels Roadmap (refer to Section 2 for a description of the project modules):

1. Feedstock supply: Strain development and cultivation; (Modules 1 and 2)
2. Feedstock logistics: Harvesting and extraction; (Modules 3 and 4)
3. Conversion/Production: Accumulation of intermediate and synthesis of fuels and co-products; (Modules 5,6 and 7)
4. Infrastructure: Fuel testing and standardization; Redacted Exemption 4

5. Sustainable practices: Life-cycle and economic analyses, siting, and resources management; Sapphire will continue to carry out LCA and economic analyses at the IABR. Sapphire will also continue to develop a comprehensive Site-Strain-Production (SSP) model used to analyze potential sites (See Figure 3).

2. Project Description

The Sapphire-led consortia propose to build the IABR project in Luna County, near Columbus, New Mexico. The IABR algae will fix approximately 56 metric tons of CO_2 per day and produce, on average, 4,200 gallons (100 barrels) of crude algal oil per day (approximately 1.5 million gallons per year).

The IABR can be described in terms of 9 key modules (Figure 2), the first 3 modules involve Sapphire's core technology, a process where CO_2, brackish water, and nutrients are introduced to the production system to cultivate and harvest oil-rich algae. After harvesting, the algae oil is extracted from the biomass using Ex.4 technology (Module 4). Extraction creates two outputs—crude oil and residual solid biomass. Like most domestic petroleum production, the oil will be shipped to the U.S. Gulf Coast to be refined by Sapphire's partner, Dynamic Fuels, located in Geismar, Louisiana (Modules 5-6). The solid biomass will be anaerobically digested at the IABR to produce methane for IABR energy requirements and to recycle nutrients back to the production ponds (module 7). As a risk mitigation alternative and depending on regulatory and market conditions, the residual solids may be sold as animal feed. Module 8 includes continued R&D efforts, where Sapphire will collaborate with industry partners to continually innovate and improve key processes. Module 9 shows the IABR project's key development partners.

Figure 2 presents the Sapphire-led group of strong partners to build and operate the IABR, the partner functions are explained in Table 5.

Figure 2: Sapphire's Partners and Process Overview

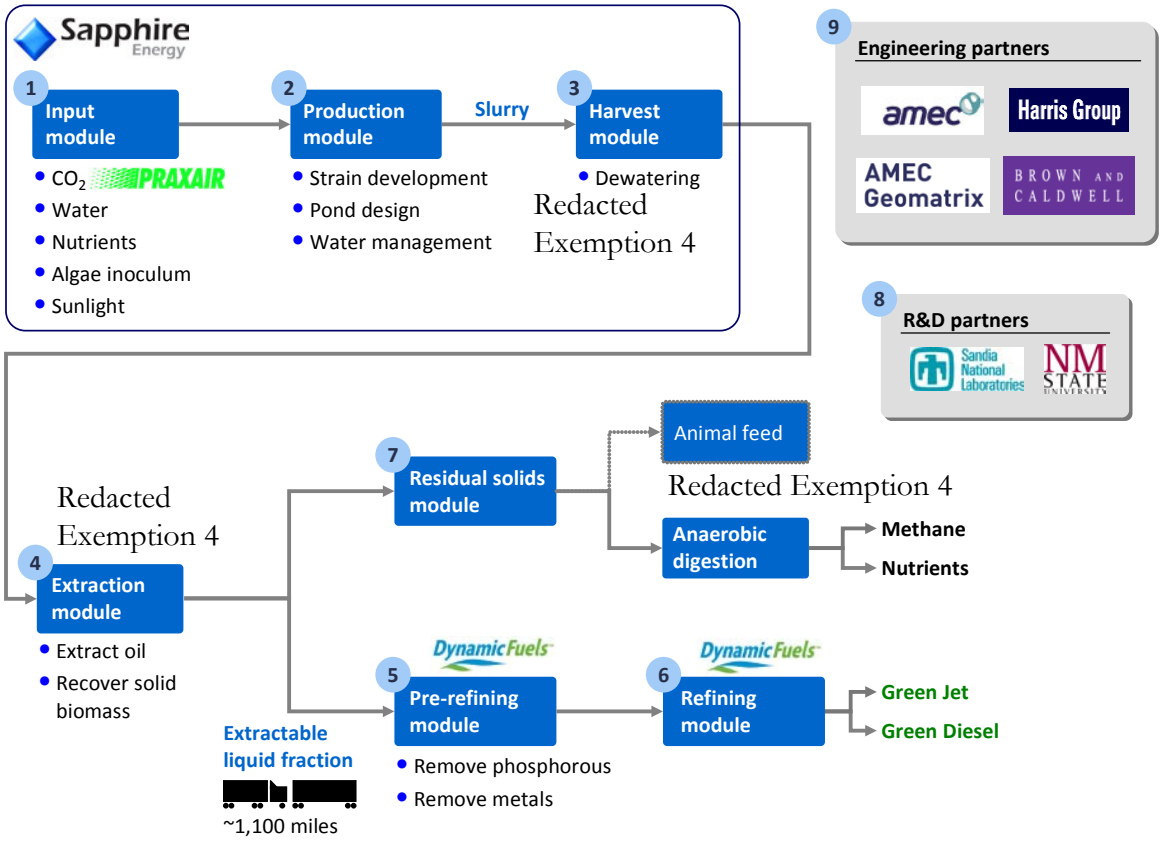


Table 5: IABR Partnership

Participants	Function
Sapphire Energy	Lead project as applicant; algae cultivation technology; IABR operator
Redacted Ex. 4	Provide extraction technology
Dynamic Fuels	Provide algal oil refining technology to produce jet fuel and diesel
Harris Group	Provide design and engineering services
AMEC/Geomatrix	Provide civil engineering, permitting, design, procurement and construction services
Praxair	Supply carbon dioxide feedstock
Brown and Caldwell	Consult on dewatering technology, water chemistry and civil engineering
Redacted Exemption 4	Provide anaerobic digestion technology
Sandia National Lab New Mexico State University	R&D partners

2.1. Schedule for the Accomplishment of Tasks

Sapphire's management team, from the executives to the Board of Directors to the Scientific Advisory Board, has extensive experience in the biofuel and energy industries. Sapphire's management is committed to executing the IABR project expediently.

Jaime Moreno, the project's Principal Engineer, has over 25 years of experience in world-scale engineering design, development, and project management. He has been involved in the design, deployment, and project management of over $10 billion in capital projects. Jaime has structured the IABR Project into 6 key phases that outline the work plan through the initial project and business development to construction, operations, and reporting (Table 6). At the commencement of the DOE Budget Period 1 in FQ2 2010), phases 0-1 will have been completed and phase 2 will have been commenced for a total cost of $

Redacted Exemption 4

The following page presents level 2 activities to be performed in each phase.

Table 6: IABR Project Phases and Expected Dates of Completion

#	Phase	Completion Date
0	Origination	05/01/09
1	Conceptual Analysis	05/29/09
2	Process Design	02/05/10
3	Front-End Engineering Design	06/30/10
4	Implementation	09/30/11
5	Checkout and Startup	10/01/12
6	Post Project Audit and Reliability	09/30/14

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2.2. Key decision points – go/no go criteria

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In summary, the key go/no go criteria are summarized in Table 7. **A successful review of tasks associated with each phase represents the go/no-go decision to proceed to the subsequent phase.**

Table 7: Sapphire IABR Key Go/No Go Decisions

Phase #	Go/no go criteria
0	
1	Redacted Exemption 4
2	
3	

Phase #	Go/no go criteria
4	Redacted Exemption 4
5	
6	

2.3. Forecast Commercial Algal Biorefinery (CAB) Summary

A key objective of the IABR is to demonstrate economic feasibility for commercialization of the Sapphire process. As technology is proven at the IABR and economies of scale are achieved, the design and construction of the first CAB will commence in 2015 and will be completed by 2018. This will represent a placement of one CAB at 150 million gallons of algal oil per annum (i.e., 10,000 barrels per day) and

Redacted Exemption 4

Figure 3 represents the schedule for deployment of the CABs over

Redacted Exemption 4

Figure 3: Schedule for Deployment of Commercial Algal Biorefineries

Redacted Exemption 4

2.4. Preliminary Design and Economic Projections

The CABs will utilize the same key processes, operations, and technologies that will be demonstrated at the IABR. A detailed description of the process modules is presented in Figure 2, PFDs and supporting data submitted as part of this application. Specifically, the CAB PFD presents the basic process concept and mass and energy balance predicted for the 1st CAB.

The anticipated CAPEX for the 1st CAB producing algal oil at 150 million gallons per annum is approximately $ Redacted Exemption 4

3. American Recovery and Reinvestment Act Information

The IABR project will promote and enhance the objectives of the American Recovery and Reinvestment Act of 2009. Sapphire has worked closely with the State of New Mexico's Economic Development Department, who has provided the key economic impact analysis that can be expected over a ten year period, from the start of operations, as a direct result of the IABR being located in Luna County, New Mexico. Sapphire will initially employ 30 workers to operate the IABR on an on-going basis, commencing in March 2011. The average annual salary of these workers is $ Redacted Exemption 4 Sapphire will invest over $ Redacted Exemption 4

In accordance to the requirements stated in this FOA, Sapphire provides a written signed statement in the Letters of Commitment stating that it intends to comply with the Davis-Bacon Act.

Table 8 presents a summary of the economic impact analysis of the Sapphire IABR supplied by the state of New Mexico Economic Development Department.

Table 8: 10-Year Economic Impact Analysis of Sapphire Energy in Luna County New Mexico

Detail	Impact
Total number of direct and indirect jobs to be created	Redacted Exemption 4
Total salaries to be paid to direct and indirect workers	
Total expected additional gross receipts	
Total property to be added to local tax rolls over the next ten years	

Source: New Mexico Economic Development Department

The project will be rapidly implemented and the stated objectives are expected to be successfully achieved

Redacted Exemption 4

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4. Cost share

The IABR project has a total budget of $ Ex. 4 (Table 9). Sapphire is seeking federal funding of $50 million. Sapphire will provide > Redacted Exemption 4 . It is predicted that the IABR will have positive cash flow after the shake –up and commissioning period in 2012 and will realize gross revenues of up to $ Redacted Exemption 4

Table 9: Summary of IABR Project Costs

Program Function	Federal Funds	Sapphire Funds	Total
Redacted Exemption 4			
Totals (% of Total Project Cost)	**50,000,000 (Ex.4%)**	Redacted Ex.4	Redacted Ex.4 **(100%)**

5. Appendix 1

Letters of Commitment from the following key partners are provided below. Sapphire intends to provide all matching funds, however, these letters confirm commitment to the Sapphire-led IABR project.

Partner Letters of Commitment	Other letters of commitment
1. Ex.4 2. Dynamic Fuels 3. Harris Group 4. Amec Geomatrix 5. Praxair 6. Brown and Caldwell 7. Redacted Exemption 4	1. IP statements from Ex.4and Dynamic Fuels 2. Sapphire's Statement of commitment to the Davis–Bacon Act 3. Redacted Exemption 4 demonstrating willingness to provide insurance to the IABR project.

Sapphire Energy

Redacted Exemption 4

3115 Merryfield Row
San Diego, California 92121
858.530.3656 ph | 888.501.8353 fax

Letter of Intent

This Letter of Intent is entered into as of the date of last signature below (the "Effective Date"), by and between Redacted Exemption 4

, and Sapphire Energy Incorporated, a Delaware Corporation, whose principal place of business is located at 3115 Merryfield Row, San Diego CA, 92121.

Whereas Sapphire and Ex.4 have a desire to enter into a collaborative engagement to commercially advance the Redacted Exemption 4 from algal biomass.

IN CONSIDERATION of the foregoing, which the parties acknowledge to be true and accurate, Sapphire and Ex.4 agree as follows:

The parties intend to enter into a Contract under which a Redacted Exemption 4 would be conducted. The contract terms will substantially reflect the program laid out in more generally below:

-
- Redacted Exemption 4
-
-
-
-
-
-
-

The parties agree to make a mutually agreeable public announcement disclosing the existence of this Letter of Intent.

This agreement shall terminate the earlier of Contract execution or May 1, 2009, unless extended in writing by mutual agreement of the Parties.

IN WITNESS WHEREOF, the parties have executed this Letter of Intent Agreement by their respective duly authorized officers:

for **Sapphire Energy Incorporated**:

By: _____

Name: PETER ATTIA

Title: DIRECTOR

Date: 4/7/2009

for Redacted Exemption 4

By: _____

Name: _____

Title: President

Date: 4/7/09

Dynamic Fuels

5416 South Yale, Suite 400
Tulsa, OK 74135

June 19, 2009

Brian L. Goodall, Ph.D.
Vice President of Downstream Technology
Sapphire Energy
3115 Merryfield Row
San Diego, CA 92121

RE: DOE Recovery Act Demonstration of Integrated Biorefinery Operations
DE-FOA-0000096 Sapphire Integrated Algal Biorefinery

Dear Dr. Goodall

Dynamic Fuels is very excited to collaborate with Sapphire Energy, Inc. in the proposed Integrated Algal Biorefinery (IABR) in Columbus, New Mexico. The IABR will bring together, at demonstration scale, critical elements in the production of algae, the extraction of oils from the algae, and the subsequent refining of the algae oil to produce renewable hydrocarbon fuels including jet fuel and diesel. A huge benefit of this approach is that the fuels are completely compatible with the existing petroleum based fuels, and can "drop in" to the existing distribution system.

Negotiation of final agreements and subsequent board and / or Management Committee approval will be required to establish the rights and obligations between Dynamic Fuels and Sapphire Energy for this program. This letter is not binding on Dynamic Fuels unless and until the parties reach mutual agreement on a long term relationship.

Dynamic Fuels LLC is a 50:50 venture between Tyson Foods and Syntroleum Corporation, to produce synthetic fuels made from renewable feedstocks. The venture intends to construct and operate multiple standalone commercial facilities capable of producing high quality, next generation fuels using Syntroleum's Bio-Synfining™ Technology. The venture builds on Tyson Food's experience as the largest protein producer in the world, with core capabilities in the processing and handling of biological materials, transportation, logistics, procurement, commodity trading and a long standing leadership position in the food industry. Syntroleum brings process engineering, design, production, operations, process technology innovation and industry leadership in ultra clean synthetic fuels production. The venture is currently building the first Bio-Synfining plant in Geismar, Louisiana. The $138 million facility will produce over 75 million gallons per year of renewable synthetic fuels from a variety of feedstocks, including

animal fats, vegetable oils and used greases. The facility construction will be completed by year end 2009, and production commencing in 1Q2010.

This letter confirms our willingness to provide toll conversion in the new Dynamic Fuels Bio-Synfining plant in Geismar, Louisiana, of the algal green crude produced at the Columbus production site IABR into green diesel, green jet fuel and naphtha as part of the Sapphire-led consortium.

The Geismar plant hydroprocesses animal fats and vegetable oils into ultra clean fuels via the four step Bio-Synfining™ Process. In the plant the crude feedstock is processed

Redacted Exemption 4

This technology builds on thousands of hours of operations of the Syntroleum Refining Pilot Unit and Catoosa Demonstration Plant. These facilities produced hundreds of thousands of gallons of synthetic fuels from FT related activities. These fuels have been extensively tested by the US DoE, auto manufactures, and academics. The DoD, used jet fuel produced in these facilities to certify the B52H to fly with synthetic fuel. Also, Syntroleum recently delivered 600 gallons of renewable jet fuel to the Air Force Research Laboratory for testing.

Assuming we can reach a suitable agreement, that has been approved by Dynamic Fuels Management Committee, for the IABR program we will process the algae oil through the Geismar facility. The first commercial demo campaign is expected to process 15,000 barrels of green crude in a three day run which will deliver more than 500,000 gallons of pure algal derived fuel (Redacted Exemption 4). The pure algal derived fuel will be fractionated by distillation into green jet fuel and green diesel, then shipped to the customers.

It will be our pleasure to participate in this significant aspect of the IABR and to the national goal of producing domestic fuels. Please contact me for more details on this proposed processing plan.

Kind regards,

Jeffrey M. Bigger
Director-Management Committee
Dynamic Fuels LLC
and
SR. VP
Syntroleum Corporation

Robert M. Ames
Management Committee Member
Dynamic Fuels LLC
and
VP and General Manager
Tyson Foods

Harris Group Inc.

April 10, 2009

Brian L. Goodall, Ph.D.
IABR Project Director
Sapphire Energy
3115 Merryfield Row
San Diego, CA 88007

Reference: Sapphire Energy
Integrated Algal Biomass Refinery (IABR) Support
Letter of Intent to Provide Engineering, Construction Management and Startup Services.
HGI Project No. 42095.00.

Dear Dr. Goodall:

Harris Group has appreciated the opportunity to support Sapphire in development of its algal biomass refinery project and corresponding USDA loan guarantee and US Department of Energy biorefinery grant applications. This development work has allowed our firm to become extensively aware of the scope and execution needs of your project in southern New Mexico.

We understand that Sapphire intends to identify Harris Group as their engineering, construction management and operations support firm in these applications. Harris Group has significant experience in similar biorefinery development projects and stands ready with the necessary staff and experience to support this effort.

Very truly yours,

James Gabriel
President and Chief Executive Officer

Communications:
P.O. Box 3855
Seattle, WA 98124-3855
(206) 494-9400
Fax (206) 494-9500
www.harrisgroup.com

Office:
Suite 200
200 W Thomas St.
Seattle, WA
98119

AMEC Geomatrix, Inc.
1824 N. Last Chance Gulch
Helena, Montana
USA 59601-0700
Tel (406) 442-0860
Fax (406) 442-0864
www.amecgeomatrixinc.com

May 1, 2009

Mr. Jaime Moreno
Vice President of Projects
Sapphire Energy Company
3115 Merryfield Row
San Diego, California 92121

Subject: Letter of Commitment and Statement of Qualifications
Sapphire DOE Grant Application DE-PS36-09GO99038
Demonstration of Integrated Biorefinery Operations

Dear Mr. Moreno:

AMEC Geomatrix, Inc. (AMEC Geomatrix) is pleased to provide Sapphire Energy Company (Sapphire) with this letter committing our resources to support the above referenced project as well as our Statement of Qualifications that describes our ability to support this effort. We are privileged to serve as a member of the Sapphire team that will support efforts to design, permit, and construct the proposed IABR facility. We believe our experience and expertise in environmental permitting, water rights, groundwater resources, civil engineering, and geotechnical engineering, as well as having a strong base in New Mexico, amply qualify us to provide these support services to Sapphire.

AMEC Geomatrix is a diversified technical consulting and engineering firm that specializes in helping our clients manage and solve tough, complex challenges throughout the world. We do this by bringing to each project some of the world's most technically-accomplished, pragmatically-oriented scientists and engineers, and a singular focus on creating the right solutions for our clients. Our team members strive to be our clients' consultant-of-choice to solve a wide range of technical challenges, from interfacing with regulators to developing designs to managing various types of programs. Over 80 percent of our revenues are from repeat clients – we believe this is reflective of our commitment to performing well and working hard to serve in the best interests of our clients.

AMEC Geomatrix is headquartered in Oakland, California with offices located throughout North America and affiliates located throughout the western hemisphere. Our team consists of more than 500 scientists, engineers, and support professionals who work on projects across the globe. When supported by our parent company, AMEC plc, our numbers grow to 24,000 employees located in 30 countries. Our expertise includes environmental, geotechnical, civil, chemical, and process engineering, air quality and toxicology, risk assessment, biological resources, and applied environmental and earth sciences. We also provide an extensive range of specialized services including computer modeling, geographic information system analysis, and litigation support. AMEC Geomatrix clients include Fortune 500 firms, businesses from major industries, service-sector organizations, and government entities at federal, state/provincial, tribal, and local levels.

The attached Statement of Qualifications summarizes our competency for completing work assignments similar to that required to support Sapphire's IABR project. The document demonstrates that we have assembled a team of engineers and scientists who are experts in their respective fields. We consider the Sapphire IABR project to be one of our most important commitments as a company and take our role in the project seriously. The AMEC Geomatrix experts who will support this project are all committed to its success and consider it a priority in their work lives. As is demonstrated in our Statement of Qualifications, should resources be needed to support other aspects of the project, AMEC Geomatrix has a broad range of experts in most environmental and engineering disciplines who are ready to become involved at key junctures of the project, as needed.

In summary, AMEC Geomatrix is proud to be a member of the Sapphire IABR team and is fully committed to supporting the IABR project. And, as demonstrated in the enclosed Statement of Qualifications, our firm has the depth of resources and expertise necessary to assure the project tasks entrusted to us will be competed efficiently, correctly, and in a timely manner. We look forward to working with the Sapphire team on this project.

Sincerely,

Myles F. Grotbo
Principal Geologist

Enc.

PRAXAIR
North American Industrial Gases

Praxair, Inc.
39 Old Ridgebury Road
Danbury, CT 06810-5113

Letter of Intent for Potential Carbon Dioxide Supply to the Sapphire Energy IABR

This Letter of Intent ("LOI"), effective 3rd April 2009 (the "Effective Date"), signifies the intent of Sapphire Energy, Inc. ("Customer") and Praxair Inc. ("Praxair") to enter into good faith negotiations on the terms and conditions to be contained in a definitive product supply agreement for the sale of liquid carbon dioxide ("Product") by Praxair to Customer (the "Agreement"). The Customer intends to use the Product for its Integrated Algae Biorefinery (IABR) which is to be constructed and operated by it at a site located in Columbus, NM. Praxair would provide an appropriate carbon dioxide supply system which may include liquid carbon dioxide storage tanks, vaporizers and other associated equipment.

1. This LOI is not an agreement to enter into the Agreement but rather an agreement governing the parties' reasonable commercial efforts to negotiate the Agreement. The parties intend to devote adequate personnel and resources to this effort and to use reasonable efforts to conclude the negotiations on or before July 1st 2010. This LOI will expire on by July 1, 2010 or the date of the Agreement, whichever comes first (the "Expiration Date").

2. The terms and conditions of the Agreement shall include without limitation provisions addressing the Agreement term and termination, prices, specifications, quantity, requirements, delivery, payment terms, supply system requirements, price changes, assumption of risk, liability, force majeure as well as such other different or similar terms and conditions as the parties may negotiate in good faith. Appendix 1 attached hereto, highlights the Praxair's qualifications and provides an initial statement of the intentions of Praxair regarding the supply of Product. Subsequent to the execution of the Agreement, Praxair and Customer would investigate creating a cooperative alliance where Praxair could assist Customer to identify and develop appropriate sources of anthropogenic CO_2 to support Customer's future commercial-scale algae facilities (which are currently estimated to require approximately Redacted Exemption 4 carbon dioxide) beginning on or about 2015.

3. This LOI and all specifications, operating data, pricing, and any other materials furnished by either party to the other in connection therewith, including any proposal submitted with this letter of intent, and the information therein are proprietary to the disclosing party. Such materials contain trade secrets and other confidential information of the disclosing party. The receiving party will not reproduce or distribute such materials except to the receiving party's employees for the purpose of performing the receiving party's obligations under this letter of intent. All such information will be received in confidence by the receiving party, and the receiving party will exercise the same degree of care to hold such information in confidence as it uses with respect to its own trade secrets and/or confidential and proprietary information. Unless otherwise agreed to by the parties, the receiving party will keep all such information confidential for a period which will expire five (5) years after the Expiration Date. It is understood that the foregoing obligation of confidentiality will not apply to information that: (a) was already known to the receiving party prior to the disclosure of same hereunder, as evidenced by the receiving party's written records prepared prior to such disclosure; (b) was in or hereafter comes within the public domain, other than by the receiving party's failure to fulfill its obligations hereunder; (c) is made available to the receiving party by a third party who does not have any direct or indirect obligation of secrecy to the disclosing party; or (d) is developed by the receiving party independent of any disclosure under this letter of intent.

4. Neither party shall issue any publicity release or announcement concerning this LOI, the provisions hereof or the transactions contemplated hereby without the prior written approval of the form and content of such publicity release or announcement by the other party.

5. Until the Expiration Date, Customer (which term shall include the Officers, Directors, employees, agents and consultants of Customer) will not directly or indirectly enter into discussions with, enter into negotiations with, solicit a proposal from, or consider any unsolicited proposal from, any third party regarding the subject matter hereof.

6. This letter of intent shall be governed by and construed in accordance with the laws of the State of New York without giving effect to any choice or conflict of laws provision or rule that would cause the application of the laws of any jurisdiction other than the State of New York.

7. Except for the provisions set forth in Paragraphs 3, 4, 5 and 6 hereof, this letter of intent will not create or constitute a legally binding agreement between Customer and Praxair or a binding obligation to negotiate or enter into the Agreement and neither party will have any liability to the other with respect to any matters covered by this letter of intent or any negotiations which have preceded or which may follow the date hereof unless and until the Agreement is executed by authorized representatives of Customer and Praxair.

Please indicate Customer's acceptance of the foregoing by signing this letter of intent in duplicate counterparts in the space provided below and returning both counterparts to me. A fully executed counterpart will be returned to you for your files upon acceptance by Praxair.

As of the Effective Date,

AGREED AND ACCEPTED	AGREED AND ACCEPTED
PRAXAIR, INC.	**SAPPHIRE ENERGY**
By:	By
Printed Name: MICHAEL O. JORDAN	Printed Name: PETER ATTIA
Title: VICE PRESIDENT	Title: DIRECTOR

201 N. Civic
Walnut Creek, CA 94596

Tel: 925.937.9010
Fax:925.937.9026

www.brownandcaldwell.com

April 30, 2009

BROWN AND CALDWELL

Mr. Jaime Moreno
Sapphire Energy, Inc
3115 Merryfield Row
San Diego, California 92121

071767-003-001

Re: Sapphire DOE Grant Application DE-PS36-09GO99038
Demonstration of Integrated Biorefinery Operations

Dear Mr. Moreno:

Sapphire Energy has developed integrated technology to create fungible fuels from algae. The Integrated Algal Biorefinery (IABR) in New Mexico will bring together, at demonstration scale, critical elements in the production of algal Green Crude and refining technologies to produce hydrocarbon fuels, including green gasoline, green jet and green diesel. We are excited at the opportunity to work with you on this important project.

Following is a brief background on our company and description of our commitment to the development of the IABR. Brown and Caldwell (BC) is a full-service national consulting firm specializing in environmental science and engineering. Since Ken Brown joined Dave Caldwell to form a consulting partnership in 1947, the firm has expanded from an engineering office in San Francisco to a nationwide operation servicing municipal and industrial clients. Today, BC is one of the largest employee-owned environmental consulting firms in the United States, with 45 offices. BC's current staff totals more than 1,500 employees. In 2008, Engineering News Record ranked us 49th among the top 500 engineering firms and 37th in "All-Environmental" firms in the United States. The quality and value that BC brings are reflected in the team of our top technical experts committed for this work.

This letter confirms our commitment to provide services for Water Quality (including Redacted Exemption 4) and Civil Design. Dr. Matt Gerhardt will be our project manager, and Dr. Melih Ozbilgin will be Project Officer. They will be assisted by Dr. John Bratby, Dr. Denny Parker and Mr. Joseph Wong on Water Quality; and Mr. Almon Shen on Civil Design. Other BC professionals will also provide assistance as needed.

It will be our pleasure to contribute to this significant aspect of the IABR and to the national goal of producing domestic fuels. Please contact Melih Ozbilgin at 925-210-2276 or Jay Patil at 925-210-221 for more details on this commitment.

Very truly yours,

BROWN AND CALDWELL

Jay N. Patil, PE
Western Business Unit Manager

Melih Ozbilgin, Ph.D.
Project Officer

Redacted Exemption 4

4/21/2009

Brian L. Goodall, Ph.D.
IABR Project Director
Sapphire Energy
3115 Merryfield Row
San Diego, CA 88007

Reference: Sapphire Energy Integrated Algal Biomass Refinery (IABR) Support Letter of Intent to Provide Engineering, Construction and Startup Services for an Algae residual based Anaerobic Digestion System.

Dear Dr. Goodall:

Redacted Exemption 4 is excited about the opportunity to support Sapphire in the development of its algal integrated biorefinery. Ex. 4 conducted successful feasibility studies of digesting spent algae and submitted a report to Sapphire dated April 2009 that outlines the process design and budget estimates.

We understand that Sapphire intends to identify Redacted Exemption 4 as their anaerobic digestion technology providers for their New Mexico based projects and we firmly support the application for government funds assistance.

Please contact us with any questions.

Sincerely

Redacted Exemption 4

Dynamic Fuels

5416 South Yale Ave Tulsa, OK 74135 1-918-590-7900 FAX 1-918-590-7979

June 18, 2009

Jason Pyle, Ph.D
CEO – Sapphire Energy
3115 MerryField Row
San Diego, CA 92121

RE: Dynamic Fuels Intellectual Property

Dear Dr. Jason Pyle,

Dynamic Fuels LLC will process the algae oil produced by Sapphire Energy in our commercial scale production facility located in Geismar, Louisiana. The technology employed in the Dynamic Fuels LLC plant is called Bio-Synfining™ which is licensed from Syntroleum Corporation. Syntroleum Corporation owns the Bio-Synfining™ intellectual property. This technology is protected in the patent application(s) US2008/0244962, US2008/0163543, and US2009/0054701.

Thus the production of Algae oil by Sapphire Energy and the processing of the algae oil by Dynamic Fuels LLC into finished fuels, will demonstrate the entire Integrated Algal Biorefinery (IABR) process.

Sincerely,

Jeffrey M. Bigger
Director Management Committee
Dynamic Fuels LLC

Redacted Exemption 4

June 18, 2009

Jason Pyle, Ph.D
Chief Executive Officer
Sapphire Energy
3115 Merryfield Row
San Diego, California 92121

Re: Redacted Exemption 4 Algae oil extraction for Sapphire IABR

Dear Dr. Jason Pyle,

Ex. 4 solely owns the intellectual property that is necessary and sufficient to legally operate its Redacted Exemption 4

As part of our business agreement with Sapphire Energy, Sapphire will have the right to use this extraction technology for its IABR project.

Sincerely,

Redacted Exemption 4

Redacted Exemption 4

April 10, 2009

Redacted Exemption 4

Subject: Sapphire Energy, Inc. - Redacted Exemption 4 Coverage

Redacted Exemption 4

Thank you for sending over the additional information on Sapphire Energy's acquisition of more acreage in NM. I can confirm that we can cover

Redacted Exemption 4

I am looking forward to working with you and the insured on this opportunity.

Best regards,

Redacted Exemption 4

Sapphire Energy

3115 Merryfield Row
San Diego, California 92121
858.352.8792 ph | 888.501.8353 fax

Statement of Compliance with Davis-Bacon Act

Davis-Bacon and Related Acts

Overview

The Davis-Bacon and Related Acts, apply to contractors and subcontractors performing on federally funded or assisted contracts in excess of $2,000 for the construction, alteration, or repair (including painting and decorating) of public buildings or public works. Davis-Bacon Act and Related Act contractors and subcontractors must pay their laborers and mechanics employed under the contract no less than the locally prevailing wages and fringe benefits for corresponding work on similar projects in the area. The Davis-Bacon Act directs the Department of Labor to determine such locally prevailing wage rates. The Davis-Bacon Act applies to contractors and subcontractors performing work on federal or District of Columbia contracts. The Davis-Bacon Act prevailing wage provisions apply to the "Related Acts," under which federal agencies assist construction projects through grants, loans, loan guarantees, and insurance.

For prime contracts in excess of $100,000, contractors and subcontractors must also, under the provisions of the Contract Work Hours and Safety Standards Act, as amended, pay laborers and mechanics, including guards and watchmen, at least one and one-half times their regular rate of pay for all hours worked over 40 in a workweek. The overtime provisions of the Fair Labor Standards Act may also apply to DBA-covered contracts.

Statement of Compliance

Sapphire, and all of its vendors associated with this Federal Program, will comply with all provisions required under the Davis-Bacon Act.

Jason Pyle, CEO

INTELLECTUAL PROPERTY STATEMENT

The data contained in pages 1-5 of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant.

1. Overview

Sapphire Energy owns, has obtained licenses or is in partnerships with parties that own or have licensed all of the intellectual property necessary to accomplish the proposed goals in developing the Integrated Algal Biorefinery. Figure 1 represents an overview of the Sapphire algae-to-biofuel process and its project partners.

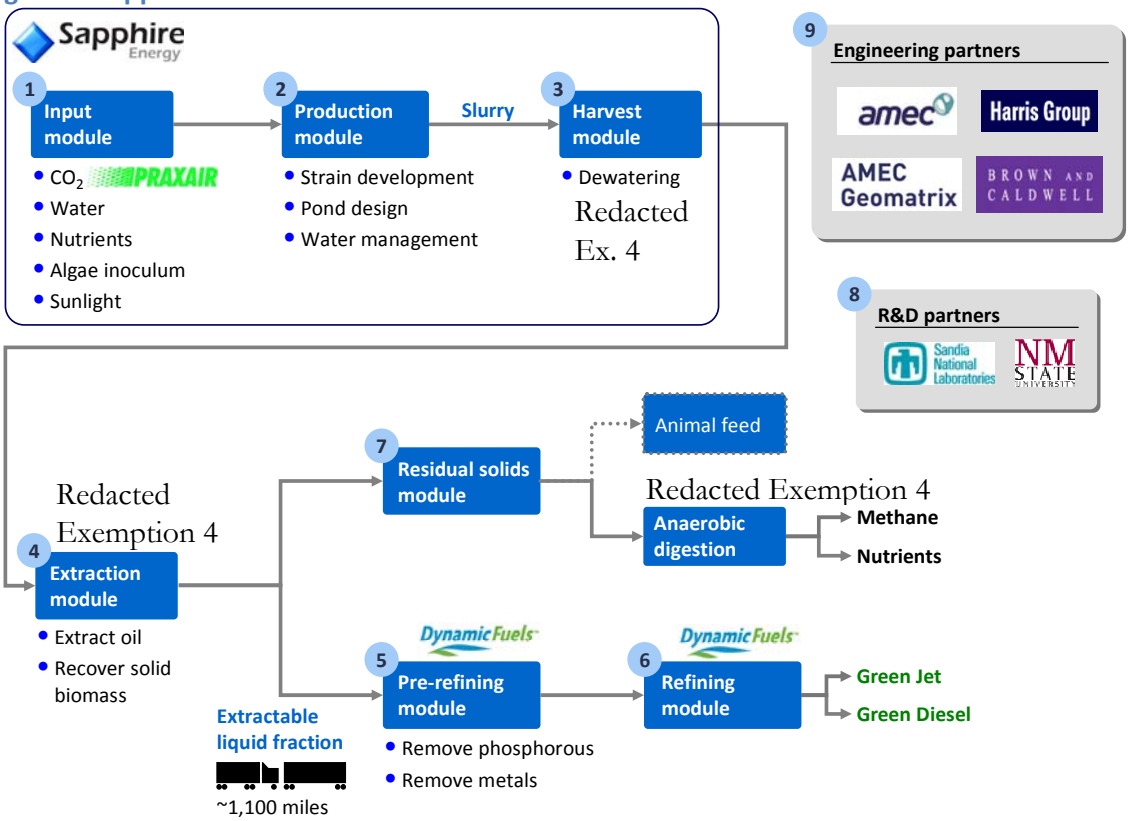
Sapphire owns or has exclusively licensed intellectual property covering key phases of the proposed project including:

-
- Redacted Exemption 4
-
-

Sapphire's partners own the licenses to all the intellectual property that will be applied to the IABR. Specifically:

- Redacted Exemption 4
- Dynamic fuels owns the IP for their proprietary conversion of algae and other oils to end-products renewable jet and renewable diesel.

Figure 1: Sapphire Partners and Process Overview



2. Sapphire Intellectual Property

2.1. Patents on Basic Methods for Manipulation of Algae Traits

Sapphire Energy has several U.S. patents and patent applications related to the manipulation of algae that will be

Redacted Exemption 4

Redacted Exemption 4

2.2. Patents on Production of Compounds Useful for the Production of Fuel

Redacted Exemption 4

2.3. Patents on Methods of Growing Algae and Harvesting Biomass

Redacted Exemption 4

Redacted Exemption 4

2.4. Listing of US Patents and Published Patent Applications in Sapphire's Intellectual Property Portfolio

Sapphire is the owner of

Redacted Exemption 4

3. Partner Intellectual Property

3.1.

Redacted Exemption 4

3.2. Dynamic Fuel Patents for the Process of Algae Oil Conversion to Biofuels

The Dynamic Fuels pending patents US2008/0244962, US2008/0163543 and US2009/0054701 are applicable to Module 5 and 6 Pre-refining and Refining. The Dynamic Fuel Syn-fining™ process consists of three steps. The first step is the

Redacted Exemption 4

A statement from Dynamic Fuels is provided in the Letter of Commitments provided in the Project Narrative that confirms that the IABR will have freedom to operate this technology.

PROJECT EXECUTION PLAN

Table of contents

Abbreviations

- CAB – Commercial Algal Biorefinery
- CGP – Construction General Permit
- ESA – Endangered Species Act
- EA – Environmental Assessment
- EIS – Environmental Impact Assessment
- IABR – Integrated Algal Biorefinery (the proposed demonstration project 1.5 million gallons per year of refinable algal oil)
- GHG – Green House Gas
- HRJ – Hydrotreated Renewable Jet
- NEPA – National Environmental Policy Act
- NMSU – New Mexico State University
- NMED – New Mexico Environmental Department
- NSR – New Source Review
- PER – Potential Emissions Rate
- PMP – Project Management Plan
- PTS – Pilot Testing Site (Sapphire's pilot testing site located in Las Cruces, New Mexico)
- RLS – Resource Loaded Schedule
- SE – Sapphire Energy
- SNL – Sandia National Laboratory
- WBS – Work Breakdown Structure

1. Work Breakdown Structure

Sapphire is proposing to build the IABR, a 1.5 million gallon per year (MGY) facility that demonstrates the commercial viability of algae cultivation, harvesting, extraction, and refining. The products of this facility are 'drop-in' replacements for two of the most important fuels in the United States: jet fuel and diesel.

In order to successfully produce jet fuel and diesel, the Sapphire IABR project plan adheres to well-exercised methods of large-scale industrial engineering and large-scale agriculture. The project plan is divided into seven phases, aligned with the stage gate process presented in the Project Management Plan (PMP). The phases and associated key activities are in Table 1 below.

Table 1: IABR Project Phases

Phase	Key Activities
Phase 0 – Origination	•
Phase 1 – Conceptual Analysis	•
Phase 2 – Process Design	•
	•
Phase 3 – Front-End Engineering Design	•
	•
	•
Phase 4 – Implementation	•
	•
Phase 5 – Checkout and Startup	•
Phase 6 – Post Project Audit and Reliability	•
	•

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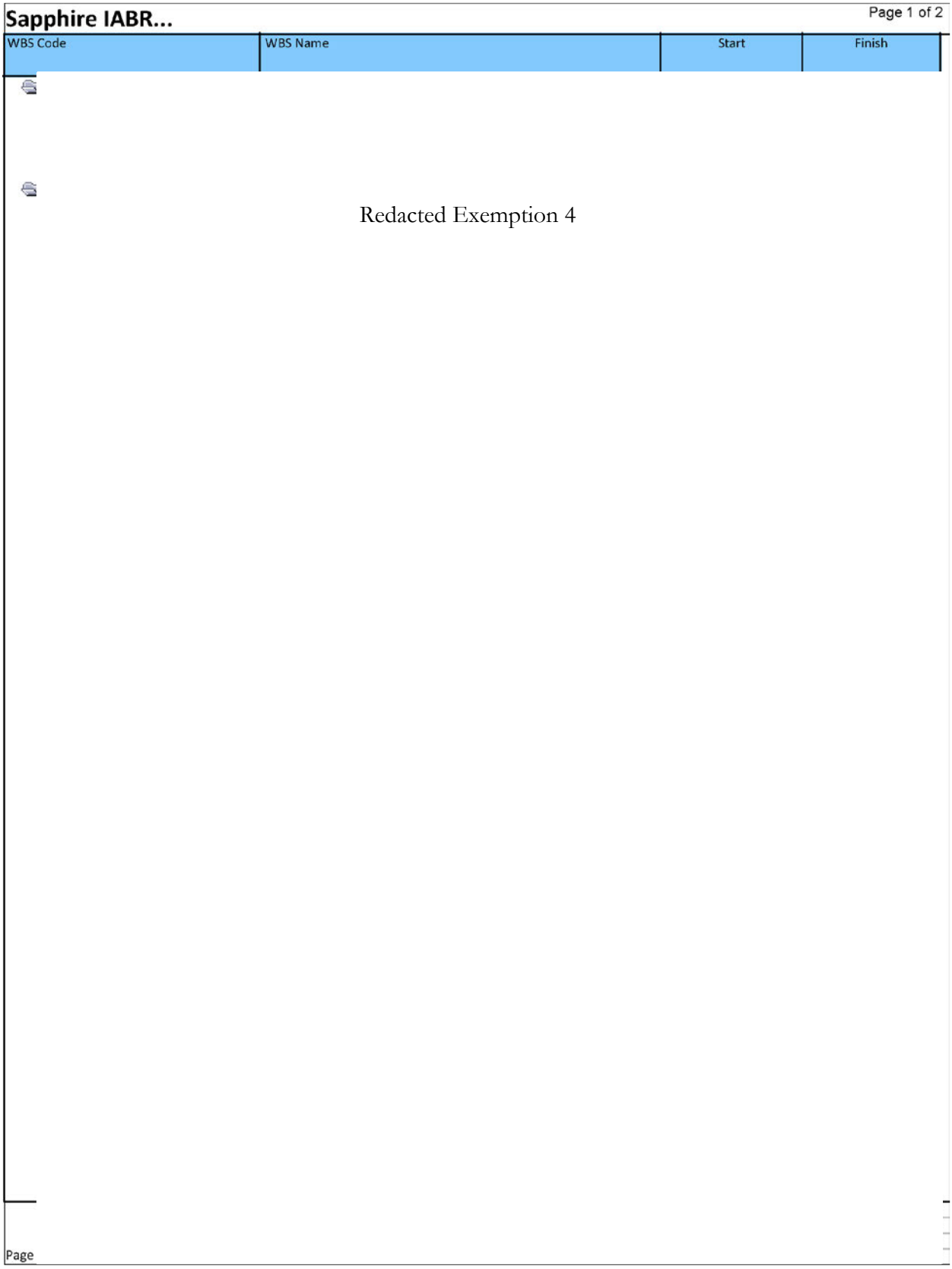
R&D activities already in progress will continue throughout the seven phases, further refining the methods and processes used in the IABR. Sapphire is working closely with New Mexico State University (NMSU) to Redacted Exemption 4 and with Sandia National Laboratories to

Redacted Exemption 4

The following contains proprietary information that Sapphire Energy requests not be released to persons outside the Government, except for purposes of review and evaluation.

Figure 1: IABR Project Plan, Work Breakdown Structure (WBS)



The following contains proprietary information that Sapphire Energy requests not be released to persons outside the Government, except for purposes of review and evaluation.

WBS Code	WBS Name	Start	Finish

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2. IABR Project Phase Descriptions

Each of the seven phases of the IABR project is crucial to the successful demonstration of an algal biorefinery. Detailed descriptions, timelines, and goals of each of the phases are below.

2.1. Phase 0 – Origination

Redacted Exemption 4

2.2. Phase 1 – Conceptual Analysis

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2.3. Phase 2 – Process Design

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Redacted Exemption 4

2.4. Phase 3 – Front End Engineering Design

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2.5. Phase 4 – Implementation

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2.6. Phase 5 – Checkout and Startup

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2.7. Phase 6 – Operational Reporting

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2.8. Key Decision Points – Go/No-go Criteria

Redacted Exemption 4

Table 2: Sapphire IABR Key Go/No Go Decisions

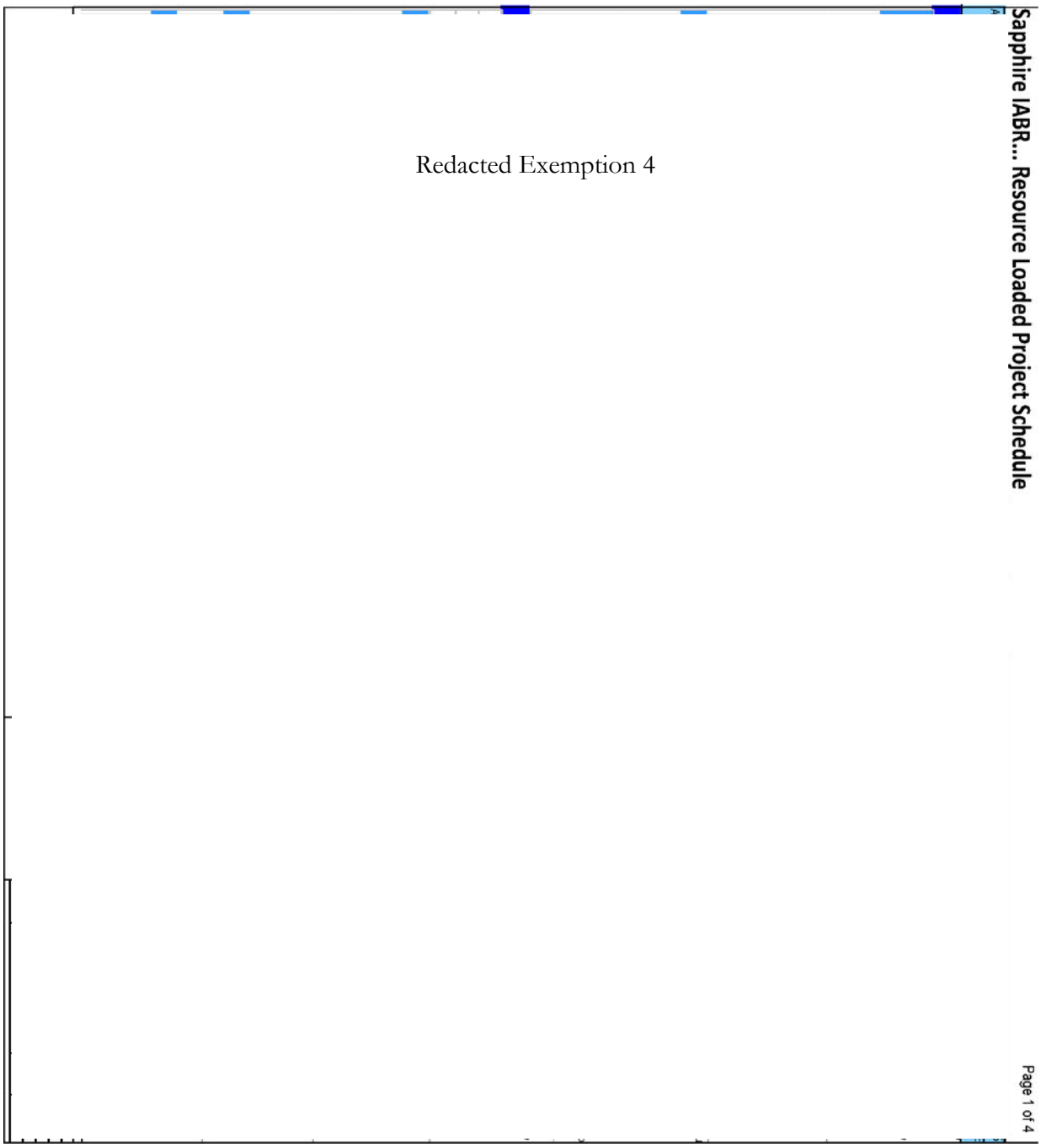
Phase #	Go/no go criteria
0	Redacted Exemption 4
1	

2	Redacted Exemption 4
3	
4	
5	
6	

3. Resource Loaded Schedule

The Resource Loaded Schedule (RLS) in Figure 2 shows the key milestones in each of the six phases and allocates spend to each time period. The RLS also includes R&D activities that will be conducted with NMSU and Sandia. Phase milestones are discussed in detail in the Project Narrative submitted with this application.

Figure 2: IABR Resource Loaded Schedule



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Redacted Exemption 4

4. Spend Plan

The RLS includes a summarized description of spend over time. This section details the spend associated with each phase of construction and operations of the IABR, beginning with a summary table of spend shown in Table 3. Project accounting codes are described in the Project Management Plan submitted with this application.

Table 3: IABR Account Budgets

Redacted Exemption 4

The Budget sheets (SF 424s) and Budget Justification sheets (PMC 1.2.3) included with this application provide detailed budget information.

Cash flow projections by account are provided in Table 4. These projections have been calculated from the RLS using Redacted Exemption 4

Table 4: IABR Project Annual Cash Flow – Expenses (thousands)

Redacted Exemption 4

Costs incurred by Sapphire prior to Jan 2010 are not presented, but represent a

Redacted Exemption 4

Sapphire engineering reporting and evaluation costs are billed to Redacted Exemption 4 . The total capital engineering and construction budget is forecast at $ Ex. 4 .

Table 5: Construction Detail Costs (thousands)

Redacted Exemption 4

5. Proposed Biorefinery Features and Facility Components

5.1. Overview

The Sapphire-led consortium proposes to build the IABR project in Luna County, near Columbus, New Mexico. The IABR will consume approximately 56 metric tons of CO_2 per day and produce, on average, 4,200 gallons (100 barrels) of crude algal oil per day, or approximately 1.5 million gallons per year. The purpose of the project is to demonstrate the commercial viability of the Sapphire process that produces jet and diesel fuel derived from renewable algae sources in the United States. Table 6 presents the general design parameters of the IABR.

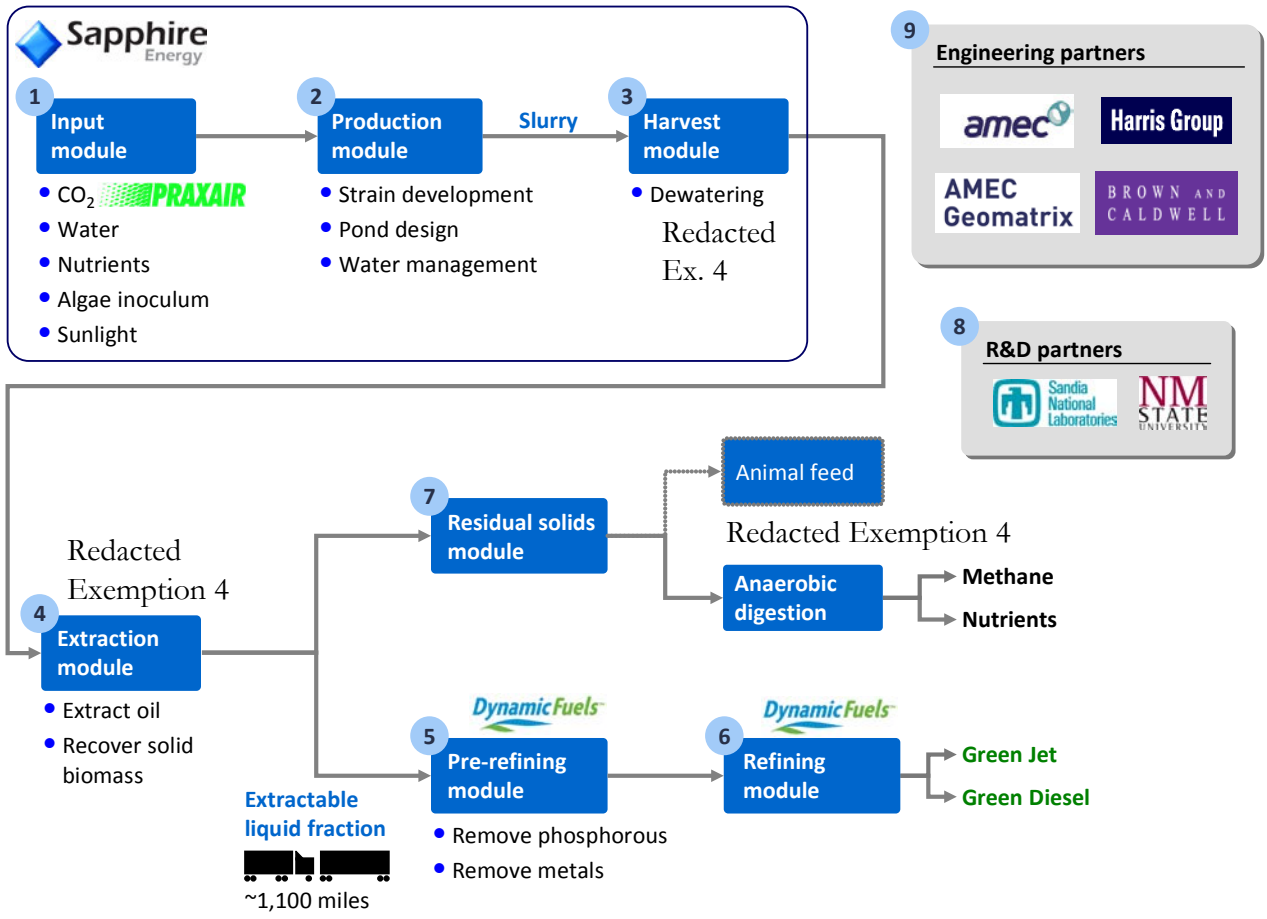
Table 6: General Design Parameters for Sapphire Energy's IABR Algae Processing Facility

Redacted Exemption 4

Fuel product(s)	-	Diesel and Jet

Figure 3 presents the general process flow. The first three modules involve Sapphire's core technology, a process where CO_2, brackish water, and nutrients are introduced to the production system to cultivate and harvest oil-rich algae. After harvesting, the algal oil is extracted from the biomass using Redacted Ex. 4 technology (module 4). Extraction creates two outputs: crude oil and residual solid biomass. Like most domestic petroleum production, the oil will be shipped to the U.S. Gulf Coast to be refined by Sapphire's partner, Dynamic Fuels, located in Geismar, LA (modules 5 and 6). The solid biomass will be anaerobically digested at the IABR site to produce methane for IABR energy requirements and to recycle nutrients back to the production ponds (module 7). As a risk mitigation alternative and depending on regulatory and market conditions, the residual solids may be sold as animal feed. Module 8 includes continued R&D efforts, where Sapphire will collaborate with academic and national laboratory partners to continually innovate and improve key processes. Module 9 includes Sapphire's partners for engineering and site selection activities.

Figure 3: IABR Process Flow Chart



Further detail is available in the Process Technology Evaluation section below and a comprehensive description is presented in the PFDs and Supporting Data.

5.2. Key Technology Accomplishment

Sapphire has demonstrated the entire pond-to-pump value chain at pilot scale by producing jet fuel with its refining partner Dynamic Fuels. Algal biomass was grown and harvested at the Sapphire Energy Pilot Testing Site (PTS) in Las Cruces, New Mexico and the algal oil was extracted Redacted Exemption 4

This oil was refined using the Dynamic Fuels Bio-Synfining™ process to produce on-specification diesel and jet fuel (Hydrotreated Renewable Jet, HRJ).

Redacted Exemption 4

Table 7: HRJ Properties from Sapphire Energy Algal Oil and Conformance to Commercial (Jet A-1) and Military (JP-8) Specifications

Property	Units	ASTM D 1655 Jet A-1	MIL-83133E JP-8	Bio-Synfined HRJ from Sapphire Energy Algal oil

Redacted Exemption 4

This pond-to-pump demonstration, conducted at both bench and pilot scale, confirms that algal oil extracted from algal biomass grown at Sapphire Energy's pilot production and IABR site New Mexico is well-suited for conversion into diesel and jet fuel meeting or surpassing all specifications.

5.3. Process Technology Evaluation: Sapphire Readiness for Demonstration Scale Operations

Sapphire has successfully demonstrated the entire pond-to-pump production process to produce fungible fuels. Each unit operation has been rigorously analyzed for technical and economic viability at the commercial scale. Construction and operation of the IABR facility is next step on the critical path to demonstrate the commercial viability of an algae-to-fuels process. A discussion of process parameters

achieved at the Las Cruces PTS for each of the seven process modules shown in Figure 3 is presented below.

5.3.1. Input Module

The Input Module's key parameters include:

- Sapphire's advanced algal strains
- CO_2
- Sunlight
- Nutrient supply
- Brackish water

The quantity of CO_2, sunlight, nutrients, and water is directly related to the volume of produced algal oil. The quantities required for the Input Module at demonstration scale will be increased to match the production volume.

5.3.1.1. Advanced Algal Strains

Redacted Exemption 4

Figure 4: Redacted Exemption 4 **Growth Rate**

Redacted Exemption 4

The lead strains from the laboratory development process were tested in the San Diego green house facility using Redacted Ex. 4 (Figure 5) that simulate the conditions at the pilot site.

Redacted Exemption 4

Figure 5: San Diego Green House Facility Redacted Exemption 4

(a) (b) (c)

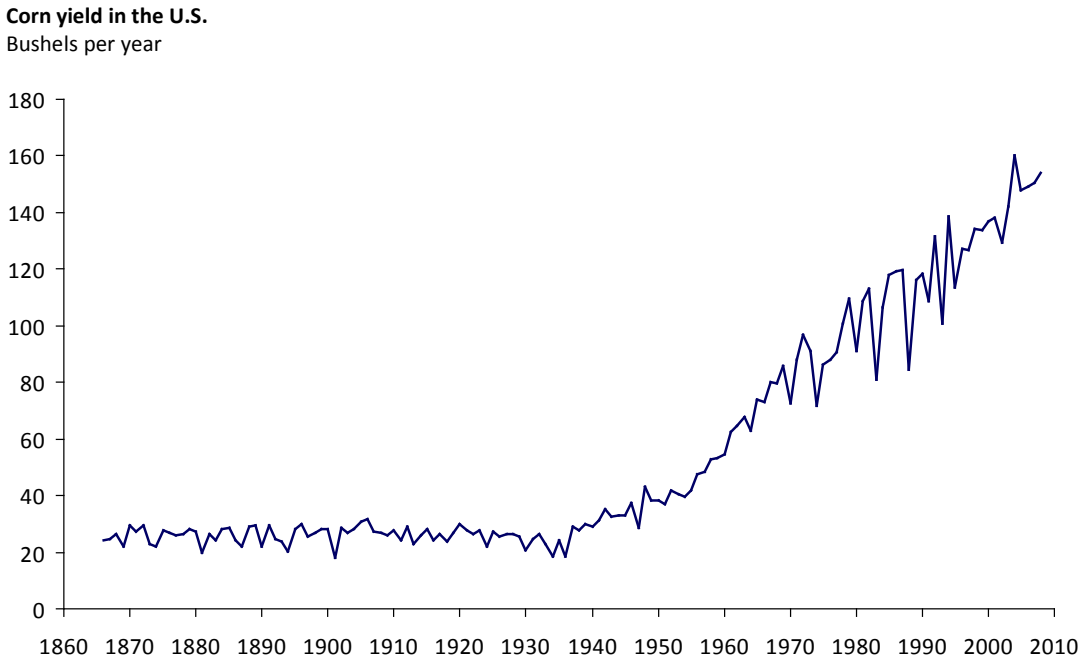
Redacted Exemption 4

Sapphire does not plan to deploy genetically modified organisms at the IABR. In anticipation of future commercial need, Sapphire has

Redacted Exemption 4

created for all promising strains. Ultimately, it is these tools that will lead to a more rapid advancement in the performance of algae, in much the same way that it has for row crops in agriculture as shown in Figure 6. Sapphire expects that commercialization of algae cultivation, breeding, and the use of biotechnology will lead to similar increases in oil production. The IP statement submitted with this application presents a summary of Sapphires achievements in this area.

Figure 6: Corn Productivity Revolution, Bushels per Acre



Source: National Agricultural Statistics Service, 2009

5.3.1.2. Carbon Dioxide

The amount of CO_2 required for the IABR will scale directly with the volume of algal oil produced. We have rigorously tested various engineering solutions for the delivery of CO_2. As shown in Figure 7, a portion of the IABR's CO_2 needs will

Redacted Exemption 4

Figure 7: CO_2 Contribution Redacted Exemption 4

Redacted Exemption 4

5.3.1.3. Sunlight

The IABR location and the PTS location have very similar solar resources, as they are located at similar elevations and latitudes in New Mexico. The required sunlight and cultivated land will both be scaled up for the IABR.

5.3.1.4. Nutrients

Algae require both nitrogen and phosphorus to produce biomass. A critical parameter in trait and strain development has been

Redacted Exemption 4

5.3.1.5. Water

Water, Redacted Exemption 4 , is a precious resource that is expensive to pump up from the ground. Water recycling, reclamation, and conservation have been engineered into each of the Sapphire Process Modules with the goal of minimizing the consumption of this critical resource. Most of the water loss in the system comes from evaporation on the surface of the ponds, which determines the

quantity of replacement water that is required. Evaporation losses scale as a function of surface area of cultivating ponds and therefore scale with production. AMEC Geomatrix is recognized as a world leader in the engineering of world scale water systems. Sapphire has developed its cultivation approach following the proven principles of

Redacted Exemption 4

5.3.2. Production Module

Sapphire deploys and cultivates its advantaged algal strains in the Production Module, which has two stages:

- Redacted Exemption 4
-

Each stage must be scaled up from pilot to IABR scale, as shown in Table 8.

Table 8: Scale Up Factors for Inoculum Train and Cultivation Ponds

Redacted Exemption 4

5.3.2.1. Inoculum

Inoculum is the initial seed crop for the cultivation ponds, prepared in

Redacted Exemption 4

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5.3.2.2. Open Pond Cultivation

The IABR will have 300 acres of ponds under cultivation and will produce on average

Redacted Exemption 4

Figure 8: Sapphire's Open Air Production Ponds

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Redacted Exemption 4

Table 9 provides a snapshot of gathered operational data for

Redacted Exemption 4

Table 9: Production Module Pilot Testing Data

Redacted Exemption 4

5.3.3. Harvest Module

The Harvest Module, Module 3, separates water from the algae so that algal oil can be extracted. Water removed in this process is

Redacted Exemption 4

As shown in Figure 9, each of these dewatering steps is

Redacted Exemption 4

Figure 9: IABR Dewatering Cost (dollars per metric ton of algae)

Redacted Exemption 4

Redacted Exemption 4

Table 10 presents a summary of the harvest module pilot data at batch scale.

Table 10: Harvesting Module Pilot Testing Data

Redacted Exemption 4

Critical performance goals achieved	Redacted Exemption 4

5.3.4. Extraction Module

After dewatering the biomass to

Redacted Exemption 4

Table 11 presents a summary of the harvest extraction pilot data at batch scale.

Table 11: Extraction Module Pilot Testing Data

Redacted Exemption 4

Figure 10 shows the successful results of batch runs using various strains of algae where

Redacted Exemption 4

Figure 10: Percent of Liquid Extracted from Various Strains of Algae

Redacted Exemption 4

5.3.5. Pre-Refining and Refining Modules

Dynamic Fuel Bio-Synfining™ is a commercial process consisting of

Redacted Exemption 4

Redacted Exemption 4

5.3.6. Residual Solids Module

The Residual Solids Module, Module 7, provides two alternative pathways for the residual, post-extraction algal solids:

- Primary: anaerobic digestion
- Secondary: animal feed

5.3.6.1. Anaerobic Digestion

Redacted Exemption 4

Table 12: Residual Solids Module Test Data

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5.3.6.2. Animal Feed

Redacted Exemption 4

Redacted Exemption 4 The Association of American Feed Control Officials (AAFCO) lists green algae as a suitable animal feed.

Table 13: Algae Residual Biomass Composition Comparison

Redacted Exemption 4

5.4. Current Status of Sapphire's Technology Compared to Competing Processes

With more than 200 patents and patent applications for strain development and biofuel production, Sapphire has a leading competitive position in algal oil production. However, the U.S. transportation fuels market is sufficiently large and growing to support many algae fuels companies or many biofuels companies without fierce, direct competition. The largest commercial corporation in the world, ExxonMobil (NYSE:XOM), produces less than 3% of the world's liquid fuel products. The current RFS legislation mandates the use of renewable fuel equivalent to 2.8 million barrels per day of petroleum by 2022, more production than any of the largest international oil majors currently produce. There is an enormous market opportunity for dozens of companies just within the RFS mandate alone. In addition, the cost of exploring and producing new barrels of fossil fuel liquids continues to rise year after year. As more and more producers turn to risky and expensive non-traditional oil projects such as tar sands, oil shale and ultra-deep water drilling, the economics of sensible energy crop fuels will begin to prevail. Sapphire is

Redacted Exemption 4

5.4.1.1. Competition from All Transportation Fuels Companies

Transportation fuel companies include some of the largest and best managed companies in the world. ExxonMobil, for example, recently broke the record for highest profit in a year by a corporation.

However, even the largest companies in this business face significant challenges of their own, both in the short and long term. Falling oil prices took Exxon Mobil profits down 70% in the fourth quarter of 2008. The economy is tied very closely to energy, particularly in the U.S.; this is a double-edged sword.

Direct competition with Sapphire from the oil majors is

Redacted Exemption 4

Redacted Exemption 4

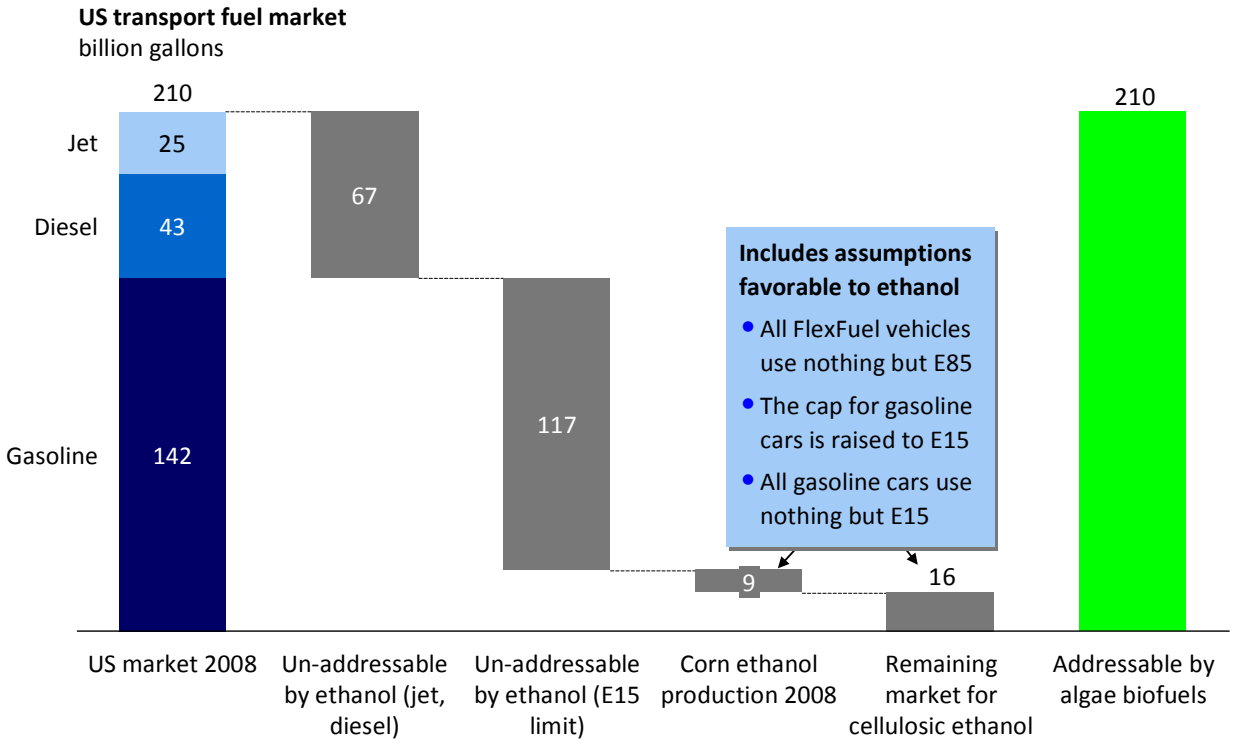
5.4.1.2. Competition from All Biofuels Companies

In general, the level of threat to Sapphire is Redacted Exemption 4 . Sapphire's process has three main advantages. First, algae production does not displace food production; it uses non-arable land and water not currently useful for agriculture. Second, algae production is a high intensity process: an acre of land generates more than 10 times more fuel for algae-based biofuel than for ethanol. Lastly, unlike ethanol, Sapphire's fuels are completely compatible with the $8-10 trillion petroleum infrastructure for gasoline, diesel, and jet fuel.

Ethanol needs to be blended with gasoline for 97% of the vehicles used in the U.S. market and is limited to 25 billion gallons even if the blending cap is raised to E15 (Figure 11). Sapphire works with other biofuels companies to promote the entire biofuels industry,

Redacted Exemption 4

Figure 11: Algal Oil Can Potentially Address All 210 Billion Gallons of U.S. Fuel Consumption



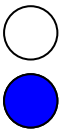
5.4.1.3. Competition from Algae Biofuels Companies

Sapphire participates in a very nascent segment of the biofuels industry. In the last five years, the number of algae companies has risen backed by increased funding from various venture capitalists. The threat level from each of Sapphire's major competitors in the algae fuel industry is discussed in detail

below (Figure 12).

Redacted Exemption 4

Figure 12: Analysis of Strongest Competition in the Algae Industry



Company	Production Capacity	Funding	Potential Product	Strategic Partners	Threat to Sapphire
Aurora Biofuels	• 500m^2 test raceway in Florida • Targeting 10-20 acre system in 2010	• $20 million 2nd round; $3.2 million 1st round. • Plans to use funds to expand operations beyond pilot scale.	• Biodiesel • Announced 18-months of successful algae production	• Florida Tech University (FIT)	Redacted Exemption 4
Synthetic Genom-ics		• Seeking to raise additional $100 million - $200 million • Backed by DFJ, Alfonzo Romo Garza	• Hydrocarbon fuels • Reported designed algae that secretes oil from outer membranes	• BP - looking at microbes to convert coal to gas *in situ*	
Algenol	• Reported, 10,000 gal/acre/yr end of 2008; 100 million gal total in 2009; 1b gal total in 2012 • Site identified in Sonoran Desert, MX	• Mexican company Biofields licensed tech for > $100 million • Biofields committed $850 million to build farm • +$70 million investors	• Ethanol-producing cyanobacteria obtained from University of Hawaii • Platform to produce other carbon-based molecules	• Mexican Gov't • Biofields • Codon Devices • Biofields 1st major customer is Mexican oil company Pemex	
Petro-Algae	• 4-acre facility in Fellsmere, FL • Eventual goals to identify 400-	• January 2009, raised $10mm through two existing investors	• Targeting 2 markets: commercial oil (fuel), specialty consumer oil	• Created by XLTechGroup • Florida Wildlife Federation • Environmental Defense Fund	

	acre and 10,000 acre facilities	• $25mm in debt, Oct. 2007		• ASU	Redacted Exemption 4
General Atomics	• Eventually 2000 acre units, not yet at 50-100 acres • 0.25 acre research ponds in Carlsbad, NM • Small ponds in San Diego	• $20 million DARPA grant winner • $4 million in federal funding • $4 million grant from Texas Emerging Technology Fund	• Looking at fossil fuel alternatives	• Eastern Kentucky University Center for Renewable and Alternative Fuel Technologies • Texas AgriLife Research, TAMU	

Long term, Sapphire will face significant competitive pressure from large oil and chemical companies and from the strongest players in the algae industry. Sapphire has significant competitive advantages to maintain its lead among algae companies and expand successfully into a major player in the transportation fuels market. These advantages include

Redacted Exemption 4

Post-production, Sapphire also maintains a significant lead over competitors. Specifically,

Redacted Exemption 4

, Sapphire is well positioned to compete in the algal oil industry.

5.5. Energy and Mass Balance

Complete Energy and Mass Balance flow diagrams are provided as part of the Process Flow Diagram submission.

Redacted Exemption 4

Redacted Exemption 4

5.6. Material Handling

The algal oil production process involves moving significant amounts of fluids, including water, algae/water mixtures, solvents, and algal oil. Sapphire has procured the services of Brown and Caldwell to ensure

Redacted Exemption 4

5.7. Materials of Construction

Each piece of process equipment at the IABR will be exposed to environmental, mechanical, and chemical factors; proper selection of construction materials can limit this effect.

Redacted Exemption 4

5.8. Waste Management

Much of the solid material generated by the bio-digester can be reused in the Sapphire process as feedstock nutrient. The rest of the solid material is

Redacted Exemption 4

6. Data Collection from the IABR for Design of Commercial Algal Biorefinery Process Engineering

6.1. Goals of IABR Data Collection

The IABR will be equipped with systems that continuously log signals from all in-line instruments for review and analysis. An automated control system will take these signals and will optimize certain biological and chemical procedures with input from technicians. The collection of this data will vitally

inform the design and operation of the commercial algal biorefineries (CABs). Data collection at the IABR has many goals, described in Table 14.

Table 14: Goals of IABR Data Collection

#	Module	Description of process	Data and Information
1	Input	Redacted Exemption 4	
2	Production		
3	Harvest		
4	Extraction		
5	Pre-refining		
6	Refining		
7	Residual solids		

6.2. IABR Process Data Collection Overview

Table 15 presents the base data that will be collected from all 7 process modules. A final decision regarding the data collection and analysis system will be made during later detailed process design phases. Many time-tested solutions exist, including Rockwell Automation's Factory Talk suite. A controls

integrator, through the Construction and Procurement Manager, will design and deliver the final system to Sapphire.

Table 15: IABR Data Collection Process

Module/Parameter	Diagnostic	Frequency	Expected Range	Reviewing Procedure

Redacted Exemption 4

The following contains proprietary information that Sapphire Energy requests not be released to persons outside the Government, except for purposes of review and evaluation.

Module/Parameter	Diagnostic	Frequency	Expected Range	Reviewing Procedure

Redacted Exemption 4

Module/Parameter	Diagnostic	Frequency	Expected Range	Reviewing Procedure

Redacted Exemption 4

7. Critical Success Factors, Competitive Advantages, and Technical Barriers

Sapphire has already demonstrated the most important critical factor for success for the IABR: a complete sunlight-to fuel process validation of all unit operations with an associated economic analysis (refer to the Historical, Current, Planned Technical and Financial data for a summary analysis). Each unit operation was advanced through concept and feasibility testing before being piloted in continuous operations. Demonstration of integrated process capability is a critical factor in any demonstration scale-up.

Progression from the IABR to the 1st CAB depends on achieving specific targets in the input and production modules to produce fungible fuels at costs that are competitive with comparable petroleum products. Research and development efforts in these areas are on-going at the Las Cruces, NM Pilot Testing Site and will continue at the IABR:

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Sapphire is confident that with sufficient testing at the IABR and its continued, well-funded development efforts in the lab and at the PTS, these targets will be reached and commercial-scale algae production is viable. Sapphire's competitive advantages, technical barriers overcome, and remaining technical barriers are discussed below.

7.1. Competitive Advantages

7.1.1. Sapphire Employs Advantaged Algae Strains Developed For Commercial Use

There is little precedent for the use of wild organisms in very large scale commercial agricultural production. All world-scale agriculture utilizes genetically advantaged organisms developed specifically to thrive in the commercial environment. While certain kinds of organisms can be grown at great expense for specialty markets (e.g., strawberries, avocados), they cannot be produced at the world-scale as an agricultural staple. In order to produce algal fuel products at commodity energy prices, algae production must mimic the robustness and cost structure of Redacted Exemption 4

Therefore, a main focus of the PTS, and a critical success factor for proceeding to the demonstration scale, is the performance validation of Sapphire's commercial algae strains.

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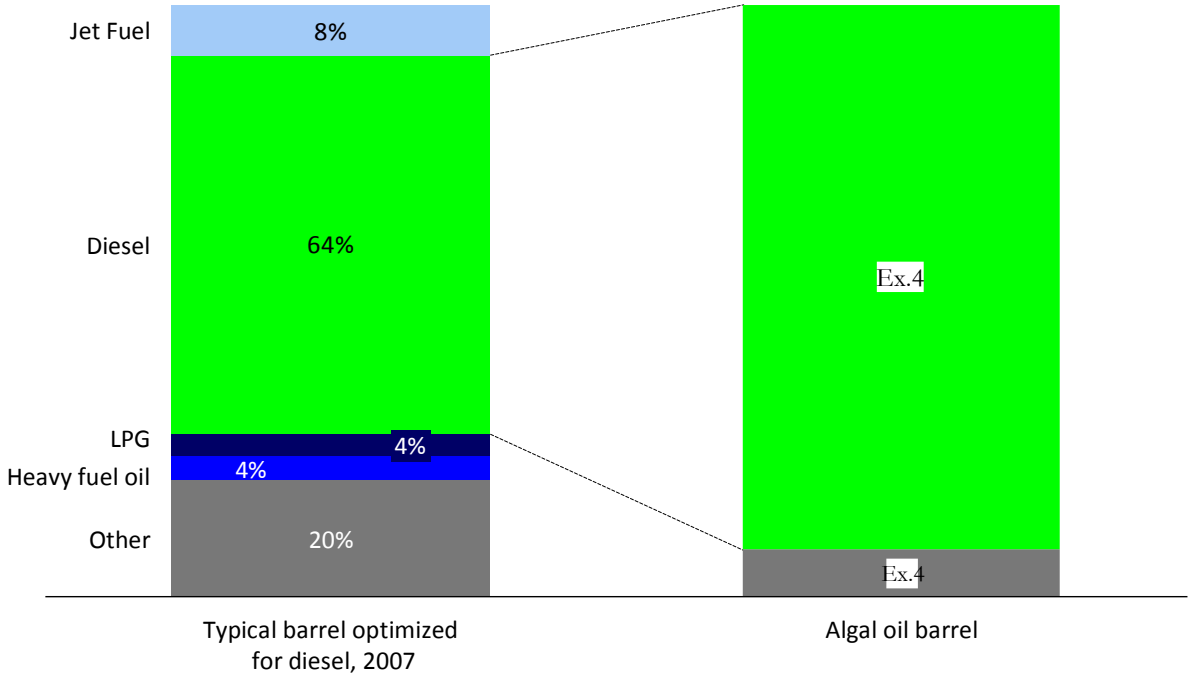
7.1.2. Sapphire Produces Fungible Fuels Compatible with the Existing Petroleum Infrastructure

The United States has invested more than $10 trillion in infrastructure for the movement, processing, storage, distribution, and use of gasoline, diesel, and jet fuel. The end-products from Sapphire's process are "drop in" fuels that are indistinguishable from existing gasoline, diesel, or jet fuels. The advantage of Sapphire's approach is that no alteration to the existing refining, distribution, or consumption activities is required to address the national challenges of climate change and energy security. Furthermore, as a crude oil, algal oil is superior to the average petroleum barrel in its useful fuel fraction. Because Sapphire algal oil yields

Redacted Exemption 4

Figure 13: Diesel Yield from a Typical Barrel of Crude Oil



Source: EIA

7.1.3. Sapphire is a Complete Energy Solution from Feedstock Production to the Fuel End-Product

Making liquid fuel requires two essential ingredients: carbon and energy. The majority of other biofuel approaches use sugars for both of these needs. In this sense, they are refining businesses, in that they refine one commodity product (sugar) into another commodity product (fuel). Furthermore, such processes not only compete with other industries (e.g., the food industry), but they often refine food products into non-fungible fuel products (e.g., ethanol and biodiesel) which are not seamless replacements for petroleum or petroleum products. Algal oil production differs significantly from this "refining" process because it uses inorganic carbon (CO_2) and sunlight as the source of carbon and energy, respectively.

Integrated algal biorefineries (IABRs) utilize a pond-to-pump model: algae produce their own refining feedstock by harnessing solar energy, CO_2 from anthropogenic and atmospheric sources, non-potable water, and a limited quantity of nutrients. The algal oil is extracted and processed directly into transportation fuel using traditional refining technology. Sapphire's scalable production facilities can grow easily and economically because production is based on the proven principals of agriculture. Each 150 million gallon per year CAB will displace Ex.4 % of U.S. fuel consumption. The area of corn production used for ethanol is currently 23 million acres and produces 4% of U.S. transportation fuel consumption. By comparison, the same land area used for algal cultivation would yield over Ex.4 % of U.S. transportation fuel.

7.2. Technical Barriers

7.2.1. Technical Barriers Overcome by Sapphire

Sapphire's strategy for overcoming the technical barriers for commercialization is based on

Redacted Exemption 4

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The biofuels demonstration flight by Continental Airlines on January 7th 2009 used a blend containing Sapphire's algae-derived jet-fuel, clear validating the viability and quality of Sapphire's process. The Jet-A derived from algal oil possessed the same physical and chemical properties as petroleum-derived Jet-A. Furthermore, the blend of biofuel and petroleum Jet-A used in the test flight was reported to have performed slightly better in the 90 minutes of operations than the pure petroleum fuel.

Other technical barriers that Sapphire has overcome in include:

Redacted Exemption 4

Redacted Exemption 4

7.2.2. Potential Future Technical Barriers to Commercialization

7.2.2.1. Crop Protection

When considering an analogous industry, such as the world-scale production of food crops, protection remains the primary challenge. Production of millions of acres of agricultural staples, such as corn and rice, are only possible by mitigating pests and competitive plants. Sapphire has

Redacted Exemption 4

7.2.2.2. Production Fluctuations

Production fluctuations resulting from seasonality and site latitude pose a challenge to all commercial agriculture operations. The hallmark of a robust, world-scale organism is its productivity in wide ranges of temperature, weather, and water chemistry. For the IABR, Sapphire has conducted tests in New Mexico at the PTS in order to verify our production capability. Sapphire will continue to develop

Redacted Exemption 4 .

7.2.2.3. Energy Efficiency

Even though the current Sapphire process is energy efficient, producing Redacted Exemption 4 energy as it uses, Sapphire will continue to investigate methods to improve energy efficiency by

Redacted Exemption 4

7.2.2.4. Feedstock supply

At the first CAB, producing 150 million gallon per year capacity, anthropogenic CO_2 sources like coal plants are viable. Redacted Exemption 4 . Sapphire will likely create multiple smaller CABs organized around available CO_2 sources, minimizing capture, compression, and transport costs. A national solution creating a market value for CO_2 will benefit Sapphire's commercialization plans. Sapphire will also continue to optimize water pH and alkalinity to enhance atmospheric CO_2 transfer from gas-to-liquid phase.

8. Justification for Construction of a New Facility

The IABR requires cultivation, harvest, and extraction facilities that do no currently exist in the United States or the world. The IABR also requires a specific geography for optimal growth. For these reasons, a new facility must be built to demonstrate economically viable algal oil production. The final conversion of algal oil to a liquid transportation fuel will Redacted Exemption 4 .

9. Siting Considerations, NEPA Compliance, and OHS

9.1. Site Ownership

The IABR facility, 400 acres in total, will be constructed on 2,000 acre parcel of land currently under escrow to Sapphire. This site is in Luna County approximately 9 miles west of Columbus, New Mexico. Sapphire Energy will

Redacted Exemption 4

9.2. On Site and Offsite Operations

All the unit operations except for algal oil pre-treatment and Syntroleum Bio-Synfining™ will be done on site. The refining partner for the Sapphire IABR is Dynamic Fuels, a fifty-fifty joint venture between Syntroleum and Tyson. Dynamic Fuels is retrofitting a brownfield site (formerly Lion Copolymer's Geismar plant) to utilize Syntroleum's Bio-Synfining™ technology for the processing of fats into renewable green diesel and jet fuel (see Figure 14). The Geismar refinery is 25 miles south of Baton Rouge, Louisiana. The site is ideally located on the Gulf Coast with access by road, rail, water, and pipelines.

Redacted Exemption 4 Additionally, the finished fuels can be transported by road, rail and water. The site, utilizing Tyson's infrastructure and logistics for alternative oil transportation, possesses its own rail spur large enough to accommodate many more railcars than Ex.4 required for IABR-scale algal oil processing.

Figure 14: Dynamic Fuels Brownfield Construction, Geismar Plant

9.3. On Site IABR Environmental Compliance

Sapphire has retained the services of AMEC Geomatrix to prepare all required permitting and NEPA documentation. AMEC Geomatrix's extensive experience and New Mexico office location enable them to provide the necessary skills to complete this process.

The program and procedures that will be used for ensuring compliance with NEPA are outlined in the

Redacted Exemption 4

A summary of the permitting activities are presented in Table 16.

Table 16: Permitting Activities

WBS ID	Name	Start	Finish
IABR.P3.2.1	CWA - NPDES (USC title 33, §1251)	9/28/2009	6/30/2010
IABR.P3.2.1.1	CWA §402 - Section 402(p) of the CWA, implemented by 40 CFR Part 122.26	9/28/2009	6/30/2010
IABR.P3.2.1.1.1	CWA §404	9/28/2009	10/16/2009
IABR.P3.2.1.1.2	Stormwater Permitting	10/5/2009	6/30/2010
IABR.P3.2.1.2	New Mexico Water Quality Act (WQA) - 5 Year Permit	11/16/2009	6/25/2010
IABR.P3.2.1.2.1	(NMAC § 20.5.2.3107 (A-E))	11/16/2009	6/25/2010
IABR.P3.2.1.2.2	(NMAC § 20.7.3)	11/16/2009	11/25/2009
IABR.P3.2.1.3	Wells	10/12/2009	10/19/2009
IABR.P3.2.2	Air Quality	9/28/2009	11/13/2009
IABR.P3.2.2.1	New Mexico's Air Quality Control Act (N.M. Stat. Ann. §§ 74-2-1)	9/28/2009	11/12/2009
IABR.P3.2.2.2	A Clean Air Act (CAA) Title V	11/2/2009	11/13/2009
IABR.P3.2.3	Endangered Species	5/4/2009	4/2/2010

IABR.P3.2.3.1	New Mexico Wildlife Conservation Act (WCA) NMAC §17.2.37 through 46	2/8/2010	4/2/2010
IABR.P3.2.3.2	The Endangered Species Act (ESA) (7 USC §136 and 16 USC §1531 et. seq.)	10/8/2009	12/23/2009
IABR.P3.2.3.2.1	USFWS conference on potentially affected T&E species	10/8/2009	12/23/2009
IABR.P3.2.3.3	Migratory Bird Treaty Act (MBTA) /Bald and Golden Eagle Protection Act (BGEPA)	5/4/2009	6/26/2009

A summary of the proposed NEPA activities are presented in Table 17.

Table 17: NEPA Activities

WBS ID / Activity	Activity Name	Start	Finish
IABR.P3.3.1	National Environmental Policy Act (NEPA) Analysis	9/28/2009	3/8/2010
NEPA.10	Conduct Baseline Data Gathering	9/28/2009	12/31/2009
NEPA.20	DOE NEPA Process (EA Assumption of Outcome)	9/28/2009	3/8/2010
NEPA.30	Prepare and Submit DOE NEPA Documentation	12/7/2009	3/3/2010
NEPA.40	Issue Draft EA	1/25/2010	1/25/2010
NEPA.50	Public Comment Period (30 Days)	1/28/2010	3/1/2010
NEPA.60	Prepare final EA	3/01/2010	3/5/2010
NEPA.70	Determination (Milestone)		3/5/2010
NEPA.80	Determination Applied to Final Design (Milestone)		3/8/2010

Refer to the Environmental Questionnaire (EQ) submitted with this application for discussion on facilities, product, waste management, waste streams, pollution controls and prevention. The EQ also discusses the potential environmental impacts of the IABR; the status of the environmental and regulatory reviews including permitting. Table 18 presents a summary of the Environmental Compliance determinations.

Table 18: Environment Compliance Determinations

Federal, State, or Local Law	In Compliance	Not in Compliance	Proposed Schedule
Clean Air Act	X [1]		Jun 2009-Mar 2010
Federal Water Pollution Control Act	X		Jun 2009-Mar 2010
Safe Drinking Water Act—Section 1424(e)	X		Jun 2009-Mar 2010
Endangered Species Act	X [4]		Jun 2009-Mar 2010
Coastal Barrier Resources Act	X		Jun 2009-Mar 2010
Coastal Zone Management Act—Section 307(c) (1) and (2)	X		Jun 2009-Mar 2010
Wild and Scenic Rivers Act.	X		Jun 2009-Mar 2010
National Historic Preservation Act	X [2]		Jun 2009-Mar 2010
Archeological and Historic Preservation Act	X [2]		Jun 2009-Mar 2010
Subpart B, Highly Erodible Land Conservation	X [3]		Jun 2009-Mar 2010
Subpart C, Wetland Conservation, of the Food Security Act	X		Jun 2009-Mar 2010

Executive Order 11988, Floodplain Management	X		Jun 2009-Mar 2010
Executive Order 11990, Protection of Wetlands	X		Jun 2009-Mar 2010
Farmland Protection Policy Act.	X		Jun 2009-Mar 2010
Departmental Regulation 9500–3, Land Use Policy.	X		Jun 2009-Mar 2010
State Office Natural Resource Management Guide.	X		Jun 2009-Mar 2010

1 – An air permit will be required; 2 – SHPO correspondence required; 3 – A revised soil conservation plan required; 4 – Coordination required related to plant species.

9.4. Off-Site IABR Environmental Compliance

The Dynamic Fuels, LLC Geismar Plant is a commercial scale production facility which is currently under construction. All requisite permits have been applied for and received, including the Louisiana Department of Environmental Quality Air Permit 0180-00195-00.

9.5. Greenhouse Gas Lifecycle Analysis

Sapphire retained the firm Redacted Exemption 4 , to quantify the GHG intensity of Sapphire's green diesel. Though preliminary, results indicate that Sapphire's algae-derived diesel emissions are Redacted Exemption 4 Replacing traditional petroleum fuel with green diesel substantially reduces lifecycle greenhouse gas emissions since the algae consume far more CO_2 than emitted during the green diesel production process. Figure 15 provides the breakdown of the Sapphire diesel production process and the life cycle emissions associated with each step in the process, showing that Sapphire's Redacted Exemption 4 Compared to petroleum-based low-sulfur diesel, green diesel reduces well-to-wheels emissions of CO_2 by nearly 70%.

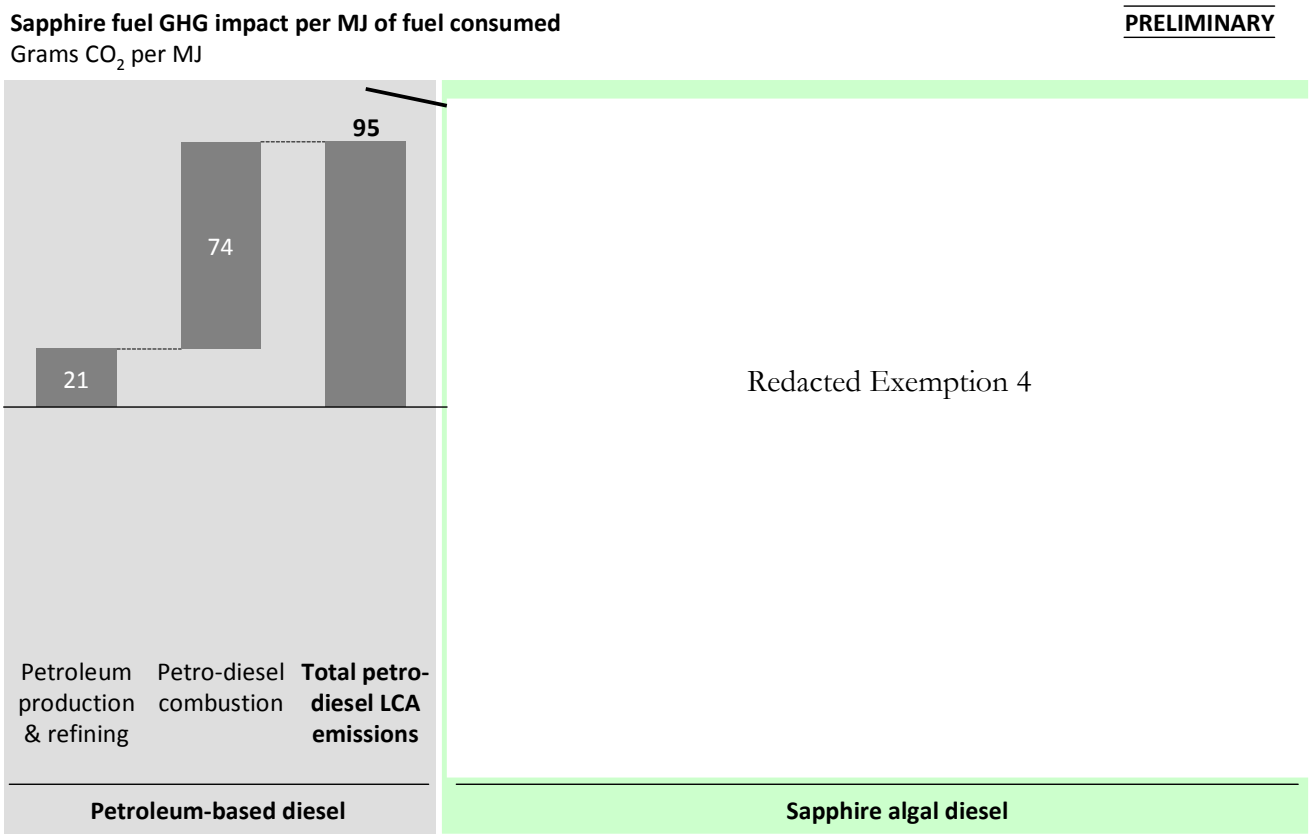
Controversies about displacing food crops with energy crops have raised tremendous environmental concern about the true GHG benefits of other biofuels. Sapphire's process is

Redacted Exemption 4

In this manner, algae production expands the agricultural production base without displacing food production. Since this process displaces no food product, there is no indirect land-use change controversy for algae.

The following contains proprietary information that Sapphire Energy requests not be released to persons outside the Government, except for purposes of review and evaluation.

Figure 15: Algal Fuel LCA Comparative Emissions, (grams CO_2 per MJ fuel)



Source: Draft values from California Air Resources Board; Redacted Exemption 4

9.6. Management of Emissions and Effluents

9.6.1. Solid Effluents

Redacted Exemption 4

9.6.2. Wastewater Effluent

Redacted Exemption 4

Redacted Exemption 4

9.6.3. Gaseous Emissions

Table 19 summarizes the air quality status of Luna County, New Mexico, as published in the Code of Federal Regulations (40 CFR §81.332 – New Mexico Southern Border Intrastate Air Quality Control Region). A review of the PM10 data from the Deming, New Mexico Airport for the calendar year 2007 showed an average 24-hour PM10 concentration, based on the raw hourly data, of 27.1 µg/m^3. The existing 24-hour PM10 regulatory standard is 150 µg/m^3.

There are no Class 1 air quality airsheds within 100 miles of the project site. The three closest Class 1 airshed are the Chiricahua Wilderness (approximately 100 miles from the site), the Chiricahua National Monument (102 miles from the site), and Gila Wilderness (111 miles from the site).

Table 19: Air Quality Status – Luna County, New Mexico

Pollutant	USEPA Designation
SO_2	Cannot be classified or better than national standards
CO	Unclassifiable/Attainment
Ozone (1 hr standard)	Unclassifiable/Attainment
Ozone (8 hr standard)	Unclassifiable/Attainment
NO_2	Cannot be classified or better than national standards
Particulate Matter less than 10 microns (PM10)	Unclassifiable
Particulate Matter less than 2.5 microns (PM2.5)	Unclassifiable/Attainment

Air emissions expected from the IABR facility include:

Redacted Exemption 4

Determination of whether the facility will require a New Source Review air quality permit and/or a Clean Air Act (CAA) Title V permit will be completed when final design plans for the IABR are developed in concert with the State of New Mexico Air Quality Bureau (Bureau). The procedure for determining the necessity of a NSR permit requires the applicant to file emissions calculations for review by the Bureau. This process has been initiated and discussions have been held with the Air Quality Bureau.

A No Permit Required (NPR) determination will follow if the facility's potential emissions rate (PER) is less than 10 pounds per hour (pph) and 10 tons per year (tpy) of any regulated contaminant or 1 tpy of lead. If the facility has a PER of less than 10 pph but greater than 10 tpy of a regulated air contaminant, a Notice of Intent to construct (NOI) is required. If the PER is greater than 10 pph and 25 tpy, an air quality permit will be required. Determination of whether the facility will be a CAA Title V source is completed

during the Air Quality Bureau's evaluation of the need for an air NSR permit. On March 9, 2009, Sapphire solicited comments from the Air Quality Bureau concerning air permitting issues. No written comments have been received from the Bureau at the time of this submittal.

9.7. Other Environmental Issues

9.7.1. Potential Impacts to Land Use

It is not anticipated that construction or operation of the IABR will result in

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9.7.2. Potential Impacts to Groundwater Aquifer and Water Right holders

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Redacted Exemption 4

9.7.3. Highly Erodible Soils and Wetlands

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9.7.4. Flora and Fauna

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9.7.5. Other Impacts

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10. Financial Assurances

A comprehensive discussion on Sapphire's Financial Assurances is presented in the Business and Commercialization Plan submitted with this application. Sapphire understands

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11. Economic Viability of Major Consumables

Redacted Exemption 4

Redacted Exemption 4

12. Estimation Methods

12.1. Capital and Construction Costs

The IABR project will cost approximately $

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12.2. Operating Costs

Sapphire's financial projections have been based on GAAP accounting principles. Conservative assumptions in the pricing of products, supplies, and services have been used throughout the forecast period.

A sensitivity analysis has been conducted to identify the greatest risks to the company and the greatest opportunities for improvement. The base case *pro-formas* and Historical, Current Planned Technical and Financial Data have been based on conservative estimates throughout. In the sensitivity analysis, realistic low case and high case values have been taken to measure the effect on cashflow against the base case.

Figure 16 illustrates the result of the sensitivity analysis using Redacted Exemption 4 There are several risks for Sapphire for the IABR project. These risks, however, are identifiable and manageable, and steps have been taken to mitigate these risks where possible.

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Figure 16: Short-term Sensitivity of Cashflow to Key Drivers ($ millions)

Low case **High case**

Redacted Exemption 4

A complete discussion of these and other risks is included in the *Business and Commercialization Plan* Document in the "Business Risks" section.

13. Instrumentation and Control Systems

The IABR instrumentation systems will be designed to continue to monitor the process parameters being monitored at the PTS. Consideration will be made to automate measurements where continued manual measurement becomes impractical at larger scales.

The IABR will be equipped with a distributed process control system that monitors and tracks all key parameters including

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The Sapphire process does not introduce any unique process measurement challenges that are not already present in established industries.

14. Feedstock Management

The process of converting algae into oil requires two main feedstocks: CO_2 and sunlight.

14.1. CO_2

This abundant source of inorganic carbon is the building block of the oil Sapphire produces. Each kilogram of algal biomass requires

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CO_2 will be delivered to the ponds from two sources: atmospheric CO_2 and anthropogenic CO_2.

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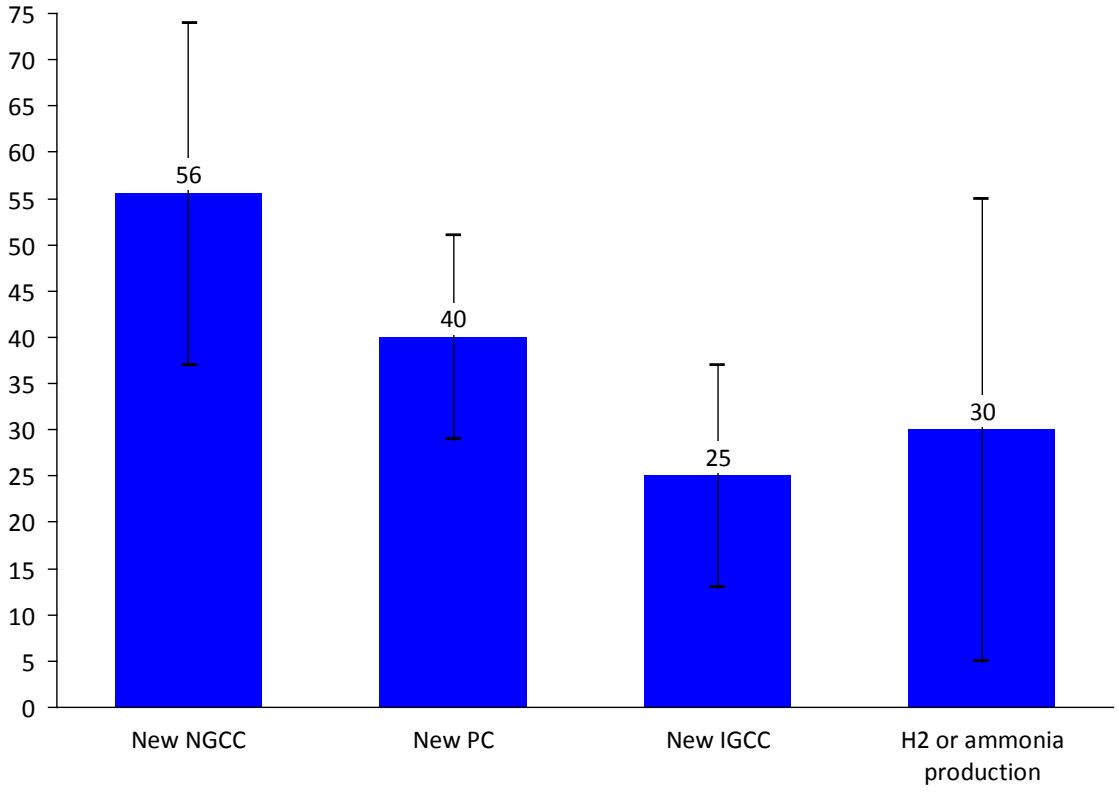
Redacted Exemption 4

Anthropogenic CO_2 for the IABR will be bought from merchant sources, delivered by Sapphire's IABR partner Praxair. This CO_2 will be entirely representative in character and quality to CO_2 used in commercial facilities. The initial cost will be approximately $Redacted Exemption 4

The current cost of CO_2 is driven mainly be capture inefficiency. Power plants currently being built with integrated gasification combined cycle (IGCC) designs are expected to come on line with a CO_2 capture cost of approximately $25/MT, while new post-combustion (PC) plants are targeting a cost of $40/MT (Figure 17). The cost of transport (via pipeline) typically adds $3 to $8 per MT, depending on the distance.

Figure 17: Technology for Carbon Capture is Reducing CO_2 Cost (dollars per metric ton CO_2)*



Source: IPCC Special Report: Carbon Dioxide Capture and Storage, 2005
**Cost includes both depreciated capital cost and operating expense*

Currently, there is a great deal of government and commercial effort going into the technologies advancing carbon capture. Most experts believe that – despite post-combustion technology being

currently well understood – IGCC and oxyfuel combustion will emerge as the superior technologies in the coming years. The main reason for this is the higher purity of the CO_2 following combustion, which greatly reduces the cost of post-combustion purification of the gas stream. The choice between these two pre-combustion technologies will likely depend on the infrastructure present. Existing coal-plants can be retrofitted with oxyfuel combustion platforms, while IGCC plants must be constructed *de novo*.

These emitters are natural partners for Sapphire. In the vicinity of the IABR alone are commercial power plants emitting over 2.4 million metric tons per year of CO_2 into the atmosphere, a quantity large enough to support the production of approximately 180 million gallons of algal oil per year. These CO_2 sources are consistent and reliable, and provide Sapphire future opportunities to grow the IABR.

The southwest United States already has an expanding network of CO_2 pipelines, mainly for the application of EOR (Figure 18). As carbon legislation approaches, not only will 'market pull' for CO_2 capture increase, so too will the market pull for CO_2 transport.

Figure 18: Southwestern Unites States Has Thousands of Miles of CO_2 Pipelines

Capacity MM tonnes CO_2 per yr	**Length** miles	**Pipeline***	**Operator**	**Origin of CO_2**
19.3	502	Cortez	Kinder Morgan	McElmo Dome
9.5	410	Sheep Mountain	BP Amoco	Sheep Mountain
7.3	217	Bravo	BP Amoco	Bravo Dome
5.2	139	Canyon Reef Carriers	Kinder Morgan	Gasification plants
2.5	80	Val Verde	Petrosource	Val Verde Gas Plants

Source: Intergovernmental Panel on Climate Change, Sapphire internal analysis

14.2. Sunlight

Eight (8) photons of sunlight are required for the fixation of each additional molecule of CO_2 into a carbon chain. While algae can technically grow anywhere sunlight shines, commercially productive growing requires

Redacted Exemption 4

While sunlight is 'free', siting of algal production fields does involve attention to other assets, specifically,

Redacted Exemption 4

15. Preparatory R&D

Part of Sapphire's competitive advantage comes from an abiding commitment to R&D, both in Sapphire's labs and pilot facilities and in partnership with leading academic and government institutions. Two such external projects will provide solutions for research questions that affect the commercial viability of an algae facility.

15.1. Low Cost Pond Liners Redacted Exemption 4

This research will be carried out in partnership with **New Mexico University**. One of the major capital costs associated with the IABR is the materials and construction of the cultivation ponds. Sapphire has developed a pond design that meets the performance metrics of the IABR. Nevertheless, the materials and treatment required to create an impermeable surface is a significant cost that can be further decreased through research and development. New Mexico State University will conduct research on Redacted Exemption 4

Redacted Exemption 4

15.2. Algae Pond Fluid Dynamic Modeling

This research will be carried out in partnership with **Sandia National Laboratories**.

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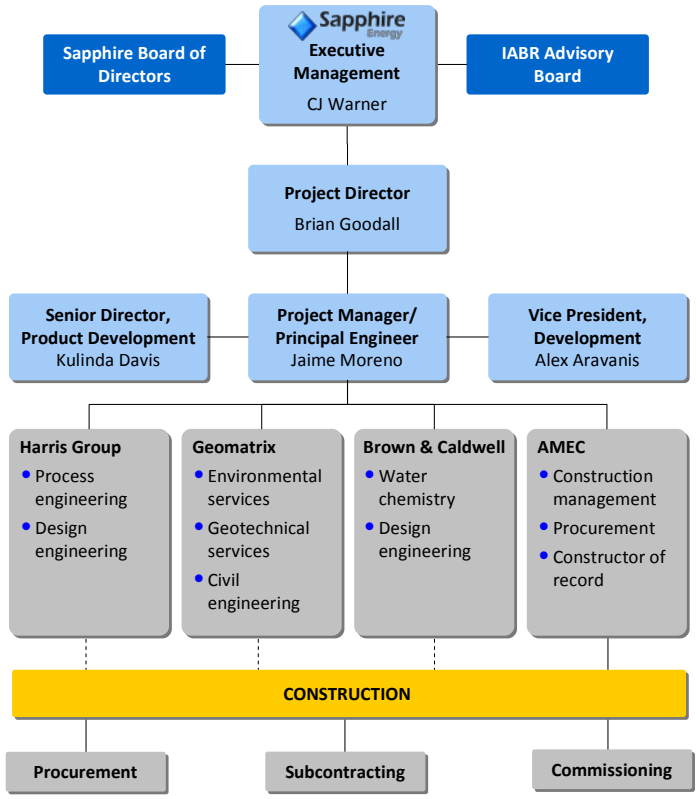
While Sapphire's design and development effort will deliver successful designs for the IABR project, the design should be further modeled and studied throughout the project. Sandia National Laboratories has exceptional expertise in modeling the mechanics and chemistry in large fluidic systems that could be further applied to the design and study of algae cultivation ponds. The deliverables of this project would be

Redacted Exemption 4

16. Applicant, Experience, Capabilities and Resources

Sapphire and consortium members collectively have the necessary expertise covering all aspects of the IABR project: feedstocks, engineering, extraction operations and maintenance, as well as product marketing. Figure 19 summarizes the roles of the partners in the consortium.

Figure 19: Project Consortium Organizational Structure



16.1. IABR Governance and Management Structure

The development, construction and operation of the IABR are part of Sapphire's critical path to commercialization. As such, the company at all levels is entirely focused and dedicated to the project's success. Sapphire has specifically recruited

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16.2. IABR Corporate Oversight and Senior Management Buy-in

Overall responsibility for Sapphire's scale up and commercialization effort belongs to CJ Warner, Sapphire's President. CJ is the most senior operating executive from an international oil major to join any alternative liquid fuel company. She brings the vast experience that comes from the direct responsibility of managing a world-wide refining network that spanned 4 continents with 11,000 direct employees. During her career, CJ has been responsible for multiple technology development programs, ushering them from the laboratory all the way to the world's largest scale. As both a senior operating executive and corporate Board Member at Sapphire, CJ holds the responsibility to apply her 27 years of energy management experience to guide Sapphire through the challenges of commercialization. She will provide direct corporate oversight of the IABR project.

16.3. IABR Executive and Operational Management

Direct responsibility for the management of the IABR project belongs to Sapphire's Vice President of Downstream Technology, Dr. Brian Goodall. Brian is widely recognized as one of the top technology developers in the petroleum and petrochemical industries. He has been responsible for the implementation of novel technologies in the processing of liquids and materials that have been advanced through all stages of development and commercialization. Following best practices, Brian has divided the IABR project into two strategic phases: an engineering and construction performance phase, and an operational performance phase. To lead the engineering and construction performance phase, Brian has appointed Jaime Moreno, Sapphire's Vice President of Projects, and IABR Principal Engineer.

As Principal Engineer, Jaime is directly responsible for the engineering and construction performance phase of the IABR project. Jaime brings 25 years of large scale project design and completion experience in the fields of water, civil structure and energy. His superlative professional reputation allows Sapphire to work with the world's very best engineering and construction management firms. Jaime has assembled an internal guidance team that works with the project's many engineering and construction partners. He brings best-in-practice methodologies to the critical first phase of the IABR project.

16.4. IABR Operational Management

Brian has divided the operations of the IABR into the logical subunits of:

Redacted Exemption 4

Mike Mendez, Sapphire's Vice President of Upstream Technology is directly responsible for the delivery of algal seed stock to the IABR. This responsibility includes oversight of all seed stock development in Sapphire's San Diego laboratories, as well as, field testing of feedstock to be used in the IABR at Sapphire's 22-acre test and development station in Las Cruces, NM. Mike brings decades of industrial biologic technology experience to the IABR team. In addition to the seed technology and development groups, he oversees the quality control team that tests and documents all biologics proposed for use in the IABR project.

While engineering and construction of the algal growth systems is the responsibility of the IABR Principal Engineer, specific expertise is required to maximize biologic performance of the algal seed in the cultivated environment. Miguel Olaizola brings three decades of algal scientific and practical commercial experience to the IABR project. Miguel is directly responsible for the monitoring and performance evaluation of the algal cultivation systems. Miguel works closely with both Mr. Mendez, in order to provide important feedback related to the seed stock, and Alex Aravanis, in order to maximize the link between algal cultivation and the harvesting and extraction systems that yield Sapphire's valuable products.

Alex Aravanis, Sapphire's Vice President of Development, is directly responsible for the critical operations of harvesting and oil extraction at the IABR. The harvesting of algal biomass and the subsequent extraction of liquid and solid components is a complex undertaking involving many disciplines of biologic, chemical and engineering science. Alex's unique technical background, which

spans traditional engineering disciplines and advanced biologic technologies, makes him uniquely qualified to sit at this crucial intersection in the IABR project.

Kulinda Davis, Sapphire's Senior Director of Product Development, plays an essential role in the evaluation of both intermediate and final product streams of the IABR project. As intermediate solid and liquid products are generated, Kulinda is responsible for their evaluation and performance monitoring. She directly oversees the disposition of solid products derived from the IABR extraction and their delivery to the biomass degrading recycling systems. In addition, Kulinda is responsible for waste determination and disposition on the IABR site.

Brian Goodall, with his three decades of petroleum and petrochemical experience, will directly oversee the transport and refining of the algal oil through Sapphire's refining partnerships.

16.5. IABR Critical Support

Responsibilities for the marketing and sales of IABR products belong to Peter Attia, Sapphire's Senior Director of Business Development and Corporate Strategy. Peter works closely with Sapphire's President, CJ Warner, and its CEO, Jason Pyle, to position Sapphire's strategy and its products in the best possible manner. He interfaces directly with all IABR partners to ensure a satisfactory and sustainable business relationship exists within the consortium. Peter and his business development team provide the essential economic analysis of the IABR project performance that will be used to further the financing and commercialization of Sapphire's process.

The development of sustainable, domestically produced liquid fuels is a national interest. As such, the IABR project makes tremendous use of Tim Zenk, Sapphire's Vice President of Corporate Affairs. Tim's long and distinguished track record in both public service and private industry has helped shape national policy for nearly 20 years. Tim is directly responsible for the aspects of policy which influence the operations and economics of the IABR, such as regulatory guidance, environmental concerns, federal mandates, taxation and national energy policy. Tim works closely with leaders in Washington D.C. to make certain that the goals of the IABR are in line with the Presidential and Congressional agendas.

16.6. IABR Key Biographies

The resumes of the key people involved in the IABR project management are contained in the Resumes File submitted with this application (Table 20)

Table 20: Key Individuals for the IABR Development

Sapphire Energy Team Members	Partner Team Members
• Cynthia J (CJ) Warner, FlChemE, President • Jason Pyle, Ph.D., CEO • Brian Goodall, Ph.D., Vice President of Downstream Technology • Jaime E. Moreno, PE, Vice President of Projects • Mike Mendez, Vice President of Technology • Tim Zenk, Vice President of Corporate Affairs • Alex Aravanis, Ph.D., Vice President of Development	• Mark Warner, Senior Process Engineer – **Harris Group** • Myles Grotbo, Principle Geologist – **AMEC Geomatrix** • Redacted Exemption 4 • Shrikar Chakravarti, Senior Development Associate – **Praxair** • Jeffery McGregor Bigger, VP of Business Development – **Dynamic Fuels**

- Kulinda Davis, Ph.D., Senior Director Product Development
- Miguel Olaizola Ph.D., Director of Production
- Peter Attia, Senior Director of Business Development & Corporate Strategy

- Redacted Exemption 4
- Melih Ozbilgin, Ph.D., Vice President - **Brown and Caldwell**
- Paola Bandini, Engineer – **NMSU**
- Scott James, Ph.D. – Scientist – **Sandia National Laboratory**

17. Decommissioning Plan Summary

The current *pro forma* shows the IABR producing algal oil for the life of the capital assets. The *pro forma* forecasts the construction of

Redacted Exemption 4

Upon the decision to permanently discontinue IABR operations, decommissioning activities will commence. Buildings and other permanent structure that can be re-used for general industrial purposes will be left in place once cleaned. All process equipment will be removed and salvaged.

17.1. Process for Uninstalling or Removing the Project

The pond system will be closed in place with permanent infrastructure removed. The majority of the cultivated acres can be returned to a condition similar to the one prior to development.

Piping for carbon dioxide delivery and electrical infrastructure for pond mixing will be removed. The refinery will have all viable materials removed and equipment cleaned. Process equipment will be removed and sold to the secondary equipment market. Permanent structures, such as buildings, will be left in place once cleaned.

17.2. Issues, Requirements, and Costs for Removal and Disposal

Sapphire has evaluated the salvage value of the IABR equipment and discussed decommissioning costs with local decommissioning contractors. The cost of decommissioning will

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IABR decommissioning will include the return of the lands to traditional agriculture condition. The operation of the IABR is similar to flood irrigation, a technique commonly used in the area, and does not reclassify the use of the lands from agricultural use, nor does it significantly alter their pre-IABR condition. The IABR will return the land with fully functional water production equipment.

The use of responsible stewardship principles throughout the IABR operation will prevent additional land reclamation costs. The IABR will be operated under a complete Environmental Management System (EMS); in alignment with Sapphire's vision for clean energy, all processes and practices will be in compliance with environmental best practices.

Cynthia (CJ) Warner – Sapphire President

Cynthia (CJ) Warner joined Sapphire Energy in February 2009 as President. She brings more than 27 years of experience in the energy, refining and transportation industries. At Sapphire Energy, CJ is tasked with driving the company's initiative to transition technology trials and research into commercial-scale crude oil operations and is presiding over the IABR project. Throughout her career CJ has demonstrated a track record of creating new sources of value and strategic connections, and managing across international boundaries and dynamic industry, market, labor, and regulatory climates.

A chemical engineer by training and one of the very few senior women in the oil and gas industry, Ms. Warner served as an executive with energy industry giants British Petroleum, Amoco Oil Company and UOP. Prior to joining Sapphire, she most recently served as Group Vice President, Global Refining for BP where she was instrumental in turning around BP's US refining business and achieving record performance in International refining. During her 10-year career with BP she held numerous leadership roles including overseeing refining operations in five continents and developing long-term technology strategies for low carbon and sustainable fuels. CJ led the groundbreaking cooperative effort with the US EPA to shape a framework for Clean Air improvements which was eventually signed on by the entire US Refining industry.

CJ's Role at the IABR Project

Overall responsibility for Sapphire's scale up and commercialization effort belongs to CJ. She is the most senior operating executive from a major international oil company to join any alternative liquid fuel firm. She brings the vast experience that comes from the direct responsibility of managing a world-wide refining network that spanned 4 continents with 11,000 direct employees. As both a senior operating executive and corporate Board Member at Sapphire, CJ holds the responsibility to apply her energy management experience to guide Sapphire through the challenges of commercialization. She will provide direct corporate oversight of the IABR project.

Education and Training

MBA in Technology Management, Illinois Institute of Technology	**1987**
Bachelor of Science in Chemical Engineering, Vanderbilt University	**1980**

Professional Experience

Group Vice President of Global Refining, British Petroleum (BP)	**2007-2008**
Group Vice President of HSSE & Technology, Refining & Marketing, (BP)	**2005-2007**

Global leader and member of the CEO's Top 30 Executive Team. Initiated tenure in a strategic change management assignment; then appointed to lead the agreed operational and safety transformation as head of the Refining organization (11K employees, 15 facilities, JVs in 8 countries and $3B annual profit). Regular participation in and interface with corporate and board-level oversight committees. Orchestrated and led the recovery of BP's Refining business, including massive infrastructure and mechanical/operational standards improvement in the US system, rebuilding technical and operational capability, and initiation of an overall cultural transformation. Championed development and initiation of a 10-year safety and

operations change management plan, endorsed by the Board and executive leadership, designed to catalyze change for rapid improvement and then to embed results for the long-term with more sustainable actions.

Vice President of International Refining, BP **2004-2005**

Leadership of a $1B, 6K-employee, multi-site organization spanning Europe, Africa and Australasia. Uncovered and addressed long-standing performance issues in 5 plants and raised the bar of performance in 4 others, generating record profitability for the region. Developed the systems and processes necessary to manage the region's performance, including increased emphasis on operational basics, and on global knowledge and resource sharing. Led the international organization to overcome cultural barriers, link together effectively, and take best advantage of their scope and scale.

Business Unit Leader of Partner Operations, Infrastructure Marketing & Services, BP **2002-2003**

Head of North Sea marketing and operations for oil and gas pipeline system ($1B net income), partner-operated production ($500M net income), and services representing >$1B of annual procurement oversight. Leveraged technological innovations to develop a ground-breaking sub-sea oil pipeline connection, which enabled a small Canadian partner to cost -effectively develop a new field and paved the way for additional pipeline business growth. Played a significant role in shaping the debate regarding the successful UK/Norway treaty to enable Norwegian gas to flow into the UK.

Chief of Staff, Refining & Marketing, BP **2001-2002**

As the primary assistant to the Chief Executive, responsible for coordinating the strategic agenda for the R&M segment, managing executive office tactics, and providing 3rd party insights to the Chief Executive. Facilitated executive office transition of a new chief executive, and acclimation with global strategies and operations. Developed the streamlined organizational structure for global marketing, facilitating adoption of a strategic approach and cohesive global brand.

Business Unit Leader, BP **1999-2001**

Appointed to lead this 100kbbl/day, 250-employee under-performing business targeted for divestiture as part of the terms of the BP-Amoco merger agreement. Delivered $50M in net income, a record figure that surpassed combined business results for the last decade. Planned and executed the sale of the business while achieving all key financial and operational goals. Engaged union leadership in change management, successful site rebasing and smooth ownership transition. Led ground-breaking EPA negotiations on behalf of all 9 BP US refineries to agree on a pollution control consent decree. Avoided costly litigation and set a new precedent for industry-regulatory interaction.

Planning & Technical Consulting, AMOCO, INC. **1983-1998**

Field Operations and Technology Development, UOP, INC. **1980-1983**

Synergistic Activities

Board Member, Deutsche BP

$57B, German subsidiary with 5 facilities, 2.5K retail outlets, energy trading and joint ventures

Jason Pyle – Sapphire CEO

Dr. Jason Pyle is a c-founder of Sapphire and has been its CEO since inception in 2007. Jason was formerly Chief Technical Officer and co-founder of Epoc, Inc., a privately held medical engineering company. Jason holds an appointment as adjunct professor of bioengineering at Vanderbilt University, where he has worked to develop cross-disciplinary programs of biological and engineering research. As the co-founder and Chief Technical Officer of Pria Diagnostics, Jason was named Innovator of the Year (2006) by Frost and Sullivan. Jason holds numerous pending and issued patents in the engineering and biological sciences and has worked in diverse cross-discipline areas such as nanofabrication, optical engineering, and structural biology.

In addition to his broad technical abilities, Jason has established numerous corporate partnerships between small technical companies and some of the world's largest corporations. He has directly supervised and coordinated both business development and operational activities within large co-development partnerships. Jason has worked in finance, technical, and manufacturing transactions in Singapore, Japan, and China. His post-doctoral research focused on the large-scale expression and control of neural proteins. He holds a Ph.D. in Molecular and Cellular Physiology and an M.D. from Stanford University. He received degrees in optical engineering and physics from the University of Arizona.

Dr. Pyle's Role at the IABR

Jason will act as CJ's substitute in case CJ is incapacitated to maintain senior level commitment and responsibility for the delivery of the project.

Education and Training

M.D., Stanford University School of Medicine **1997-2005**

Ph.D. in Molecular and Cellular Physiology, Stanford University School of Medicine **1997-2002**

B.S.E in Engineering Physics & Optical Sciences, University of Arizona **1994-1997**

Professional Experience

Adjunct Professor of Biomedical Engineering, Vanderbilt University **2005-2007**

Served on Vanderbilt's Academic-to-Industry advisory board. Educated undergraduate and graduate engineering students. Conducted collaborative bioengineering research with four Vanderbilt professors spanning multiple biologic and engineering disciplines.

Founder and Partner, Epoc Engineering, Inc. **2006-2007**

Developed financing through institutional, private, and government funding organizations. Directly managed all company research activities.

Chief Medical Officer, Pria Diagnostics **2005-2006**

Assisted in the strategic planning for deployment of the company's technology platform. Aided in technical and business development partnership discussions.

Founder and President, MB Enterprises **2003-2007**

Provided independent industrial consulting services. Served as expert advisor to multiple large consultancy firms. Developed strategic technical planning for large and small companies with developing research and development programs in biological and bioengineering sciences.

Founder, Chief Science Officer, Pria Diagnostics **2003-2005**

Obtained substantial technology financing through institutional, private, and government funding organizations. Concluded multiple technology licensing contracts. Established industry and academic collaborations to run multiple research projects. Directly managed all company research activities.

Publications

1. Boyden ES, Pyle JL, Chatila TA, Tsien RW, Raymond JL. Selective plasticity mechanisms for motor memory storage. *Neuron* 2006 Sep 21;51(6):823-34

2. Harata NC, Choi S, Pyle JL, Aravanis AM, Tsien RW. Frequency-Dependent Kinetics and Prevalence of Kiss-and-Run and Reuse at Hippocampal Synapses Studied with Novel Quenching Methods. *Neuron*. 2006 Jan 19; 49(2):243-56.

3. Pyle JL. Fluorescent diagnostics and their application to the testing and treatment of human disease. *Stanford Medical School Clinical Journal.* May 2004.

4. Pyle JL*, Piedras-Renteria ES*, Diehn M, Glickfeld LL, Harata NC, Cao Y, Kavalali ET, Brown PO, Tsien RW. Presynaptic homeostasis at CNS nerve terminals compensates for lack of a key Ca2+ entry pathway. *Proc Natl Acad Sci U S A.* 2004 Mar 9; 101(10):3609-14. Epub 2004 Feb 27.

5. Aravanis AM, Pyle JL, Harata NC, Tsien RW. Imaging single synaptic vesicles undergoing repeated fusion events: kissing, running, and kissing again. *Neuropharmacology*. 2003 Nov; 45(6):797-813.

6. Pyle JL*, Aravanis AM*, Tsien RW. Single synaptic vesicles undergoing rapid, successive fusions without loss of identity. *Nature*. 2003 Jun 5; 423(6940):643-7.

Synergistic Activities

Visiting Scholar, University of California San Diego, 2008

Innovator of the Year, Frost and Sullivan, 2006

Brian L. Goodall, PhD - VP of Downstream Technology

Dr. Brian Goodall joined Sapphire in 2008 as the Vice President of Downstream Technology. Brian contributes to the strategy and operation of Sapphire Energy and is also responsible for leading research and development of processes and refining technologies. Brian led all of the efforts that contributed to Sapphire Energy's "first flight" on January 7th, 2009, which demonstrated the use of sustainable biofuel to power a commercial aircraft for the first time ever in North America. The demonstration flight -- which was conducted in partnership with Boeing, GE Aviation/CFM International, and Honeywell's UOP -- marked the first sustainable biofuel demonstration flight by a commercial carrier using a two-engine aircraft, a Boeing 737-800.

Brian's career has spanned three decades in the petrochemical, materials and energy industries. He is an expert in all areas of catalysis; his commercial successes include the catalyst used to make 40% of the world's polypropylene. He has worked for Royal Dutch Shell, BF Goodrich, Albemarle, Rohm and Haas Company, and Imperium Renewables, where his team delivered 1000 gallons of biojet fuel used on Virgin Atlantic's first-ever commercial "green" jet flight. Brian is a corporate honoree at the National Inventors Hall of Fame, and is responsible for over 80 patents, 60 papers, countless academic collaborations, and winning $20 million in federal funding in the last decade.

Dr. Goodall's Role at the IABR Project

As IABR Project Director, Brian will manage all aspects of the project. Brian is widely recognized as one of the top technology developers in the petroleum and petrochemical industries. He has been responsible for the implementation of novel technologies in the processing of liquids and materials that have been advanced through all stages of development and commercialization.

Education and Training

Ph.D., Inorganic and Organometallic Chemistry, University of Bristol, UK

Postdoctoral Fellowship, NATO, University of Chicago

Professional Experience

Vice President of Technology, Imperium Renewables **2007**

Responsible for all aspects of research and development and technology development; building a new division, a new laboratory, sought external funding and developing new technology from alternative feedstocks (new seed oils, algae and the like) to fixed-bed catalysts to biojet fuel, glycerol utilization and next generation biodiesel technology. Transformed the strategy of the company from a pure biodiesel (FAME) play to 'biodistillates' (sustainable diesel and biojet) from non-food oils via hydrotreating. Lead all aspects of the biojet initiative and "Prime" status on the DARPA "algae to biojet" initiative and directed the production of the first ever large demonstration quantities (2 x 1,000 gallons) of a biojet fuel which will be used in upcoming Virgin flights from London to Amsterdam and Air NZ flights.

Chief Scientist, Senior Fellow & Program Manager, Rohm and Haas **2002-2007**

Created a world class research and development team, raised $3.5 million in external funding, discovered the first catalysts capable of copolymerizing ethylene and acrylates (and other polar monomers) to high MW, linear, random copolymers and built a strong IP portfolio. Initiated research programs into biofuels, in particular novel heterogeneous biodiesel catalysts (esterification, etherification, transesterification) and ran the Fellow's organization, innovation workshops and the internal venture program.

1999-2002

Director of New Technology & Senior Research Fellow, Albemarle

At Albemarle he instigated, grew and led the New Technology Group, refurbished an R&D facility, built a high throughput screening capability used by Albemarle and third parties, raised $2 million in external funding and co-invented a new class of well-defined, stoichiometric catalyst activators.

1988-1999

Director, Chemical Sciences Department & Senior Research & Development Fellow, BF Goodrich

Assembled an international research and development team and established a brand new research and development facilities. Pioneered the use of late transition metal polymerization catalysts to generate a whole new family of polymers. Raised roughly $10 million in external funding. Identified the potential value of these new systems and through multiple industrial and academic relationships. Developed these novel polymers into a new class of materials with promising utility in the microelectronics industry. Led a team of 20+ to first commercialization and spinoff as a new company (Promerus) now owned by Sumitomo-Bakelite, who manufacture these polymers for a variety of applications such as high-end optical films, deep UV photoresists, low-k dielectrics and wave guides.

Senior Staff Scientist, Shell **1976-1988**

Invented and led the commercialization of the SHAC (super high activity catalyst) which is used today in the manufacture of roughly 16 billion pounds of polypropylene (about 40% of the world's capacity). Extended this team of 3 research assistants and myself to as many as 63 scientists at the peak stages of the development and commercialization. I contributed in many other (largely catalytic) technologies ranging from oligomerization to hydroformylation, carbonylation and epoxidation and completed an "internal MBA" with annual 3-4 week multi-site, international courses on all aspects of business, finance and the oil and petrochemical businesses.

Patents

Holder of >50 patents

Publications

>60 publications in refereed journals

Jaime Moreno, PE – Sapphire VP of Projects

Jaime Moreno joined Sapphire Energy in January 2009 as the Vice President of Projects. He is responsible for contributing to the strategy and operations of the Company. Jaime has more than 20 years of professional experience. He is highly experienced within the practice of engineering, especially with projects that include all facets of engineering studies, planning, design, management, and design/build. Jaime has participated in a variety of projects, which include storm water, water facilities, wastewater, wastewater facilities, utility engineering, public works, infrastructure, transportation improvements, environmental engineering, construction management, regulatory compliance and water resource projects.

Prior to joining Sapphire Energy, Jaime has served as Chief Operating Officer and Principal Engineer of AMEC Geomatrix, Inc., Managing Principal for AKM Consulting Engineers, and Engineering Manager for Church Engineering, Inc. Jaime received his M.S. in Civil Engineering from Stanford University and a B.S. in Civil Engineering from the University of California, Berkeley. He is a Registered Civil Engineer and a Member of the American Society of Civil Engineers.

Mr. Moreno's Role at the IABR Project

As Principal Engineer and Project Manager of the IABR, Jaime is directly responsible for the engineering and construction performance phase of the IABR project. Jaime brings 30 years of large scale project design and completion experience in the fields of water, civil structure and energy. His superlative professional reputation allows Sapphire to work with the world's very best engineering and construction management firms. Jaime has assembled an internal guidance team that works with the project's many engineering and construction partners. He brings best-in-practice methodologies to the critical first phase of the IABR project.

Education and Training

Master of Science, Civil Engineering, Stanford University	**1984**
Bachelor of Science, Civil Engineering, University of California, Berkeley	**1983**

Professional Experience

Vice President of Projects, Sapphire Energy	**2009 – Present**
Chief Operating Officer and Principal Engineer, Geomatrix Consultants	**2002 - 2009**
Principal, AKM Consulting Engineers	**1990 – 2002**
Engineering Manager, Church Engineering	**1986 – 1990**
Project Engineer, Lowry & Associates	**1984 - 1986**

Synergistic Activities

American Society of Civil Engineers

Construction Specifications Institute

Orange County Water Association

Society of American Military Engineers

National Society of Professional Engineers

American Water Works Association

Michael J. Mendez – VP of Upstream

Michael Mendez is a co-founder of Sapphire Energy as has been the Vice President of UpstreamTechnology since inception in 2007. He is widely recognized as a one of the preeminent industrial molecular geneticists of our time. In addition to collaborative academic work on the Human Genome Project, he has held a number of top industry positions at the forefront of the molecular biology revolution and is widely regarded as one of the leading pioneers in the development of fully human antibodies. At Sapphire, Mike is responsible for upstream technologies and corporate strategies, where he has been instrumental in creating upstream technologies for the molecular biology platform.

Mike is the lead author and co-inventor of the Xenomouse platform technology that formed Abgenix, Inc., most recently acquired by Amgen for $2.2 billion. In addition to serving as Director of Bioengineering at GenWay, Mike was also Associate Director of Exploratory Research at Syrrx, Inc. (presently Takeda Pharmaceuticals). There he established a new department that focused on novel platforms for over-expression, purification, and crystallization of membrane proteins. Mike co-founded and led the technical program at MemRx, a structural biology company that focused on the structure determination of membrane proteins, specifically GPCRs. Mike is widely regarded as one of the trailblazers in the development of novel genetic engineering platforms.

Mr. Mendez's Role at the IABR Project

Mike is directly responsible for the delivery of algal seed stock. This responsibility includes oversight of all seed stock development in Sapphire's San Diego laboratories, as well as, field testing of feedstock to be used in the IABR at Sapphire's 22-acre test and development station in Las Cruces, NM. Mr. Mendez brings decades of industrial biologic technology experience to the IABR team. In addition to the seed technology and development groups, he oversees the quality control team that tests and documents all biologics proposed for use in the IABR project.

Education and Training

Graduate Studies, University of Colorado Health Sciences Center **1989-1991**

Bachelor of Science, Biology/Molecular Genetics, Oregon State University **1985**

Professional Experience

Visiting Scientist, Doug Rees Laboratory, California Institute of Technology **2004-2005**

Processed techniques for the overexpression, crystallization and structure determination of GPCRs and TRP channels which focused on parameters that effect the purification and crystallization of these membrane proteins and the re-modeling of the baculoviral genome specifically for the expression of membrane proteins.

Director & Principal Scientist, Sagres Discovery **2003-2004**

Led and established San Diego division of Sagres Discovery for structure based drug design of candidate genes validated from the Oncogenome™, focus on membrane proteins.

Co-Founder/Principal Scientist, MemRx Corporation **2002-2003**

Invented and developed all intellectual property of MemRx Corporation, focused on the overexpression, crystallization and structure determination of membrane proteins, specifically GPCRs. Developed novel platforms using both insect and mammalian expression systems and a mutagenesis platform used to crystallize GPCRs which was acquired by Sagres Discovery.

Associate Director/Exploratory Research, Syrrx, Inc. **2001-2002**

Led and established the La Jolla lab of Syrrx Inc. Established a new department focusing on the overexpression, purification and crystallization of membrane proteins with an emphasis on GPCRs. Developed novel mammalian platform using viral vector technology borrowed from gene therapy and applied it for the overproduction of protein to be used in crystallography.

Founder and Principal Scientist, Gryffin Consulting, Inc., **2000**

Genetic engineering - Established and Founded

Geron, Inc **2000-2001**

Designed and engineered four oncolytic adenoviral vectors used for the treatment of cancerous tumors in Geron's Phase II trials. These vectors were the key technology purchased from Geron by Novartis (2001) and later purchased by Cell Genesys (2002).

Gentrol, Inc. **2000- 2001**

Designed and engineered second-generation cell lines used in the over production of beta-interferon and alpha-interferon. These cell lines are used as the platform technology used by Gentrol, Inc.

Publications

1. **Mendez, M.J.,** Green L, Corvalan J, Jia X-C, Maynard-Currie C, Yang X-D, Gallo M, Louie D, Lee D, Erickson K, et al. Functional transplant of megabase human immunoglobulin loci recapitulates human antibody response in mice. Nature Genetics, Volume 15, pp: 146-156 (1997).
2. **Mendez, M.J.,** Abderrahim, H., Noguchi, M., David, N.E., Hardy, M.C., Green, L.L., Tsuda, H., Yoast, S., Maynard-Currie, C.E., Garza, D., Gemmill, R.M., Jakobovits, A., Klapholtz, S... Analysis of the structural integrity of YACs comprising human immunoglobin genes in yeast and in embryonic stem cells. Genomics, Vol. 26, pp: 294-307 (1995).
3. **Mendez, Michael J.;** Hybrid Yeast-Bacteria YAP Cloning and Uses Thereof Submitted January 19, 2000. Docket num.Cell-401/106482-345
4. **Mendez, Michael J.;** Finer, Mitchell. A Novel Hybrid Yeast-Bacteria Cloning System and Uses Thereof. Submitted June 8, 1999. Docket num.Cell-401/106482-265

Tim Zenk – VP of Corporate Affairs

Tim Zenk joined the Sapphire Energy Team in 2008 and is an active contributor to the strategy and operations of the company and he leads the development of all local, state, and federal policy regarding Sapphire Energy's business. He is responsible for public relations, collaborators, consultants, and service providers. Mr. Zenk has spent much of his distinguished career shaping public policy – in helping leaders become better leaders and the public become more educated about key issues impacting the nation and the globe. His more than 20 years of rich experience has taken him from the front lines of Washington, D.C., to the back roads of the Middle East, and to rural areas working on big issues in small towns. Most recently, as executive vice president for Edelman, an international communications firm, he built and led numerous campaigns, organized public-private partnerships, and counseled energy, biotech and technology leaders.

Mr. Zenk's Role at the IABR

The development of sustainable, domestically produced liquid fuels is of national interest. As such, the IABR project makes tremendous use of Tim's long and distinguished track record in both public service and private industry has helped shape national policy for nearly 20 years. Tim is directly responsible for the aspects of policy which influence the operations and economics of the IABR, such as regulatory guidance, environmental concerns, federal mandates, taxation and national energy policy. Tim works closely with leaders in Washington D.C. to make certain that the goals of the IABR are in line with the Presidential and Congressional agendas.

Education and Training

Bachelor of Art in Political Science and Communications **1984**

Washington State University

Professional Experience

Senior Vice President, Edelman **2004-2008**

Provided strategic counsel to key clients, including large scale industrial projects where local and national advocacy, public relations, government affairs were required. Focus was national and local. Served as key top executive within Edelman national structure with focus on building business and growing internal team capabilities.

Gregoire for Governor, Campaign Chairman, Seattle **2003-2004**

Oversaw the successful gubernatorial campaign. Provided direction on public policy development, communications, advertising, polling and grass roots campaigns. Provided political counsel to AG Gregoire, managed campaign team and poltical consultants.

Co-Founder and Vice President, Marketing, Chameleon Technology, Seattle **2001-2003**

Oversaw development of a start-up company brand, marketing and communications strategy.

Provided direction and counsel to president and board of directors on launch of a new corporate brand and launch of new wireless technology. Areas of emphasis: brand creation, new company announcement, and new product roll out.

Vice President, Marketing and Corporate Communications, TeleCommunication Systems Inc., Seattle, Washington D.C. **2000-2001**

Oversaw all activities related to image and reputation of a leading wireless communications company. Provided direction and counsel to all divisions worldwide ,including CEO and executive staff. Areas of emphasis: product launches, media relations, corporate branding, analyst relations, investor relations, corporate contributions, trade shows, crisis communications, government affairs, and serve as corporate spokesperson. Position required regular contact with executive staff, providing counsel on corporate brand and communications issues.

Vice President, Corporate Communications, Xypoint Corporation **1999-2000**

Oversaw brand development of high growth wireless location technology company. Provided direction and counsel to president and CEO on all marketing and public relations activities. Areas of emphasis: development of corporate brand, brand architecture, industry analyst strategy, media relations, investor relations, trade shows, industry conferences, and corporate spokesperson. Reported to the Chief Marketing Officer and CEO. Managed staff of 4 and three communications agencies.

Vice President, Public Affairs, The Rockey Company, Seattle **1995-1997**

Oversaw public affairs division, including budgets, revenue production, new business development. Areas of emphasis: managed major client accounts, grassroots initiatives, media positioning, communications, crisis communications, and marketing/branding. Clients ranged from Global fortune 500 forest product resource companies, and regional shipping and barging businesses to small cutting edge technology companies. Grassroots initiatives included the founding of the Cascade Columbia Alliance and Ethanol Producers for Clean Air Alliance. Managed a staff of 11.

Synergistic Activities

Vice President Al Gore: Directed *State* visits to numerous countries including, Japan, Kingdom of Belgium, Egypt, Israel, Tunisia and Russia and its republics.

Vice President Al Gore: Directed visits of the Vice President throughout the United States

Kulinda Davis, PhD – Sr. Director of Products

Dr. Kulinda Davis, Sapphire Energy's Senior Director of Product Development, joined the team in 2008 and is responsible for developing corporate strategy related to the development and production of industrial co-products. Kulinda is responsible for fundraising and grant writing along with providing general executive support to the overall success and welfare of the Company.

Kulinda was formerly Director of Emerging Technologies at Pacific Ethanol Inc., where she was responsible for cellulosic ethanol development. She was the Principal Investigator on a $25 million grant from the U.S. Department of Energy awarded for a 1/10th scale demonstration cellulosic ethanol integrated biorefinery in 2008. As a senior consultant at PriceWaterhouseCoopers, Sydney Australia, Kulinda worked in the Advisory-Performance Improvement business.

Dr. Davis' Role at the IABR Project

Kulinda plays an essential role in the evaluation of both intermediate and final product streams of the IABR project. As intermediate solid and liquid products are generated, Kulinda is responsible for their evaluation and performance monitoring. She directly oversees the disposition of solid products derived from the IABR extraction and their delivery to the biomass degrading recycling systems. In addition, Kulinda is responsible for waste determination and disposition on the IABR site.

Education and Training

Ph.D., Microbiology & Biotechnology **2001-2005**

Masters of Applied Biotechnology, University of Western **1997-2001**

Bachelor of Science – Food Science and Post-harvest Technology **1993-1996**

Professional Experience

Technical Director, Pacific Ethanol **2007-2008**

Developed and implemented appropriate business and operational strategies for second generation biofuel production technologies including plans and budgets to meet PEI's needs as well as identify business risks. Was awarded $25M from the Department of Energy as the Principal Investigator and Project Director to build the first second generation ethanol plant in the Pacific Northwest.

Senior Consultant – Advisory, PricewaterhouseCoopers **2005-2006**

Performed a variety of business consulting functions, including reviews of policies and procedures, market research, regulatory updates, stakeholder interviews, data analysis, definition of key performance indicators and report writing, with the view to add value through quality recommendations to improve business performance. Performed administrative and project management duties including preparing meeting agendas, minutes, monitoring action items and progress against budgets and schedules. Managed senior management's performance metrics to

ensure compliance with PwC standards.

PhD Candidate / Consultant University of Western Sydney (UWS) **2002-2005**

University of New South Wales (UNSW) and Manildra Starches Pty Ltd

Research was motivated by the impetus to find alternative uses of a waste-product of Manildra Starches Pty Ltd which was the focus of a recent Environmental Protection Agency investigation. Closely worked with operational and management staff at Manildra Group. Mapped current technologies to provide short-term and long-term technological and operational recommendations for improved efficiency and yield while meeting regulatory requirements. Part-time duties as a tutor and laboratory demonstrator in biotechnology provided solid experience in presentation skills and crystallized both operational and scientific understanding of renewable fuel production processes and their commercial feasibilities globally.

Publications

1. **Davis, L.,** Svenson, C., Pearce, J., Rogers, P. Evaluation of Zymomonas-based ethanol production from a hydrolyzed waste starch stream. Biomass and Bioenergy 30 Issues 8/9 (2006) 809-814.

2. **Davis, L.,** Y-J, Jeon, Svenson, C., Pearce, J., Rogers, P. Ethanol production from wheat stillage by recombinant Zymomonas mobilis. Biomass and Bioenergy 29 (2005) 49 -59.

3. **Davis, L.,** Svenson, C., Pearce, J., Rogers, P. Development of a flocculating strain of recombinant Zymomonas mobilis for ethanol production. Applied Microbiology and Biotechnology Journal. In Press.

Miguel Olaizola, PhD – Director Production

Dr. Miguel Olaizola joined Sapphire Energy in 2007 as the Director of Production. He has over twenty years of experience in the fields of algal biology and oceanography. Miguel has developed new algal bioreactor technology, pioneered novel extraction technologies, and created the first algal collection used to research photosynthetic carbon sequestration. He is responsible for the development and implementation of large scale algal-based biofuel feedstocks, including the management of Sapphire Energy's Las Cruces, New Mexico's testing and demonstration site.

In particular, Miguel is responsible for Sapphire's photobioreactors. He identifies, procures, and characterizes candidate algal strains and characterizes Sapphire's GMO strains. He is responsible for and determines photosynthetic efficiency, growth-rate, light-dark cycle and nutrient requirements. In addition, he identifies and provides introductions to potential partners for large-scale algal production. Also, Miguel develops production models that include assessment of cost, yield, obstacles, etc. and establishes goals and milestones for a long-term research and development plan.

Dr. Olaizola's Role at the IABR Project

While engineering and construction of the algal growth systems is the responsibility of the IABR Principal Engineer, specific expertise is required to maximize biologic performance of the algal seed in the cultivated environment. Miguel brings three decades of algal scientific and practical commercial experience to the IABR project. He is directly responsible for the monitoring and performance evaluation of the algal cultivation systems. Miguel works closely with both Michael Mendez, in order to provide important feedback related to the seed stock, and Alex Aravanis, in order to maximize the link between algal cultivation and the harvesting and extraction systems that yield Sapphire's valuable products.

Education and Training

Ph.D. Biological Oceanography, University of New York **1993**

Masters of Science in Marine Environmental Science, University of New York **1986**

Bachelor of Science in Biology, State University of New York **1983**

Associates in Liberal Arts, Mount Saint Clare College in Indiana **1982**

Professional Experience

Chief Scientist, Consultant to Pacific Sun Energy **2007**

Directed research programs leading to the development of algal-based fuel feedstocks.

Operations Manager, Green Fuel Technologies Corporation **2006-2007**

Responsible for SOP standardization and the lead microalgal biologists, development of industrial-scale techniques to optimize production of biofuel feedstocks from microalgae, and deployment of Company's first large scale photobioreactor.

Research Physiologist, Research Manager, Director of Research, Mera Pharmaceuticals/Aquasearch, Inc **1996-2006**

Managed all aspects of discovery and production of high value products from microalgae. Developed and implemented the new microalgal photobioreactor technology and the novel extraction technology that lead to launch of commercial microalgal product. Principal Investigator for a US$2.4 million grant from the US Department of Energy.

Postdoctoral Investigator, Marine Life Research Group Scripps Institution of Oceanography **1995-1996**

Investigated the effects of changing hydrographical conditions on phytoplankton growth and physiology in the California Current System using 14C labeling of phytoplankton pigments. Investigated changes in phytoplankton photophysiology (pigmentation, photosynthetic quantum yield) in response to changing hydrographic conditions.

Postdoctoral Fellow at the Joint Research Centre Institute for Remote Sensing Applications **1993-1995**

Investigated the utilization of phytoplankton fluorescence to estimate oceanic and lacustrian primary productivity on short-time and large-geographical scales. Utilized remotely sensed physical data (dynamic topography, wind stress) in the study of phytoplankton productivity variability.

Publications

1. **Olaizola, M.** 2003. Microalgal removal of CO2 from flue gases: changes in medium pH and flue gas composition do not appear to affect the photochemical yield of microalgal cultures. Biotechnology and Bioprocess Engineering, 8: 360-367.

2. **Olaizola, M.** 2003. Commercial development of microalgal biotechnology: from the test tube to the marketplace. Journal of Biomolecular Engineering, 20: 459-466.

3. **Olaizola, M**. and M.E. Huntley. 2003. Recent advances in commercial production of astaxanthin from microalgae. In: Recent Advances in Marine Biotechnology. Vol 9. Biomaterials and Bioprocessing, edited by M. Fingerman and R. Nagabhushaman. Science Publishers, New Hampshire, pp: 143-164.

4. **Olaizola, M.** 2000. Commercial production of astaxanthin from Haematococcus pluvialis using 25,000 liter outdoor photobioreactors. Journal of Applied Phycology, 12: 499-506.

5. **Olaizola, M.,** R.J. Geider, L.M. Graziano, W.G. Harrison, G.M. Ferrari and P. Schlittenhardt. 1996. Synoptic study of variations in the fluorescence-based maximum quantum efficiency of photosynthesis across the North Atlantic Ocean. Limnology and Oceanography, 41: 755-765.

Synergistic Activities

Reviewer for: Aquaculture, Applied Biochemistry and Biotechnology, Applied Microbiology and Biotechnology, Biotechnology and Bioengineering, Deep-Sea Research, Journal of Applied Phycology, Journal of Biomolecular Engineering, Journal of Biotechnology.

Dr. Peter Attia – Sr. Director Business Development

Dr. Peter Attia joined Sapphire Energy in August 2008 as the Senior Director of Business Development and Corporate Strategy. He is responsible for contributing to the strategy and operations of the company and business development of production. He manages the technical and administrative staff and project budgets. Previously, Peter was a consultant and a member of the corporate risk and healthcare practice with McKinsey & Company. He spent five years at the Johns Hopkins Hospital as a general surgery resident and has authored numerous medical and research papers. Along with his M.D., from Stanford University he has a Bachelors of Science Degree in mechanical engineering and mathematics from Queen's University.

Dr. Attia's Role at the IABR Project

Responsibilities for the marketing and sales of IABR products belong to Peter. Peter interfaces directly with all IABR partners to ensure that a satisfactory and sustainable business relationship exists within the consortium. Peter and his business development team provide the essential economic analysis of the IABR project that will be used to further the financing and commercialization of Sapphire's process.

Education and Training

Doctor of Medicine, Stanford University School of Medicine **1997-2001**

Bachelor of Science in Engineering & Mathematics, Queen's University **1992-1996**

Professional Experience

Engagement Manager, McKinsey & Company **2006-2008**

Responsible for credit risk modeling, health care strategy, and intersection of healthcare and financial services. Healthcare experience in payments, provider systems, medical devices, claims processing and functional specialization in corporate risk (portfolio risk, credit risk) and applications of risk modeling to financial services.

General Surgery Residency, Halsted Resident, The Johns Hopkins Hospital **2001-2006**

Awarded outstanding contribution to teaching, June 2002. Outstanding Resident of the year in June 2003. Outstanding contribution to teaching June 2003. Received a top score on the American Board of Surgery In-Training Exam amongst surgical house-staff and top score award on ABSITE amongst surgical house-staff in January 2005.

Surgical Oncology Fellowship, Post Doctoral Fellow, National Cancer Institute (NIH) **2003**

Clinically, carried out experimental surgical protocols (e.g., hepatic infusions, isolated limb infusions) for patients with metastatic disease. Lab work focused on immune-based, primarily antibody-mediated treatment for metastatic cancer.

Clinical Electives Program, National Cancer Institute, National Institutes of Health **2000**

Examined the relationship between toxicity and response rate of patients with metastatic melanoma receiving high-dose Interleukin-2 (IL-2) treatment. Summarized literature to date regarding growth rates of tumors and reviewed literature on patients with metastatic melanoma presenting with elevated serum Ca2+ in the presence of PTH-rP.

Medical Scholars Project, Department of Otolaryngology, Stanford Medical Center **1998**

Grew septal chondrocytes in cell culture and conducted experiments growing chondrocytes on biodegradable polymer scaffolds in three dimensions.

Honor Thesis, Mathematics and Engineering **1995-1996**

Queen's University, Clinical Mechanics Group, Biomedical Engineering

Mathematically and statistically analyzed 2-D microstructure of compression-molded Ultra High Molecular Weight Polyethylene (UHMWPE) to predict 3-D microstructure. Developed a technique to determine whether compression-molded UHMWPE is isotropic or anisotropic.

Research Assistant, Fluid Mechanics Laboratory **1995**

Queen's University - Department of Mechanical Engineering

Designed and constructed channel for studying vorticity effects of flow over forward facing step.

Publications

1. Powell DJ Jr, **Attia P,** Ghetie V, Schindler J, Vitetta ES, Rosenberg SA. Partial reduction of human FOXP3+ CD4 T cells in vivo after CD25-directed recombinant immunotoxin administration. J Immunother. 2008 31(2):189-98

2. **Attia P.** Mediastinal Disease. The Johns Hopkins Manual of Cardiac Surgery. McGraw-Hill. Baumgartner WA, Yuh DD Ed. January 2007.

3. Maker AV, Yang JC, Sherry RM, Topalian SL, Kammula US, Royal RE, Restifo NP, Yellin MJ, Haworth LR, Levy C, Allen T, Mavroukakis SA, **Attia P,** Rosenberg SA. Intra-patient dose escalation of anti-CTLA-4 antibody in patients with metastatic melanoma. J Immunother. 2006;29(4):455-463.

4. **Attia P,** Powell DJ, Maker AV, Kreitman RJ, Pastan I, Rosenberg SA. Selective elimination of human regulatory T lymphocytes in vitro with the recombinant immunotoxin LMB-2. Journal of Immunology, 2006;29(2):208-14.

5. Maker AV, **Attia P,** Rosenberg SA. Analysis of the cellular mechanism of antitumor responses and autoimmunity in patients treated with CTLA-4 blockade. J Immunology. 2005 1;175(11):7746-54.

Mark Warner, Principal Engineer – Harris Group

Mark Warner is the Director of Program Management Services for Harris Group. His role is to manage the full service execution of complex renewable energy projects, where he is responsible for engineering, procurement, construction management, commissioning, and startup.

Mark has 22 years of broad-ranging business, technical, and management experience in capital projects and renewable energy. He recently led permitting, engineering, construction, and commissioning of the largest biodiesel production facility in the US. The $85 million dollar project was taken from permit application to commercial operation in 14 months and included successful completion of third party performance test to meet all proforma criteria. In facility operations, he has served in positions with increasing responsibility, including plant manager. Mark has proven ability to deal with labor organizations, local communities, and officials at top political levels, including governors, senior staff, and agency directors, to bring renewable energy projects to successful completion.

Harris Group's Role at the IABR Project

As providers of engineering services to the IABR, where Mark is principal engineer, Harris Group will supply comprehensive engineering and consulting services in the production of fuel and chemicals from renewable feedstocks through sustainable technologies. The company's experience encompasses conventional and emerging technologies for conversion of biomass into ethanol, biodiesel, biogas (methane), commodity chemicals, and other saleable products and byproducts. Harris Group's history in biorefining dates back to 1994 and the development of a process for conversion of municipal solid waste to ethanol. Since then, they have worked alongside entrepreneurs, researchers, and project developers on a variety of projects, from traditional corn ethanol and biodiesel to cellulosic ethanol and renewable diesel. Harris Group is a recognized leader in next generation biofuels technologies and was selected by the U.S. Department of Energy to provide independent oversight on some of America's first biorefineries, which are being partially funded by the DOE.

Education and Training

Bachelor of Science, Chemical Engineering	**2001-2005**
Washington State University, Pullman, Washington	
Registered Professional Engineer, Chemical, Washington	

Professional Experience

Director of Program Management Services, Harris Group	**2008 - Present**
Vice President of Engineering, Imperium Renewables	**2006 – 2008**
Various capacities, Weston Solutions	**2001 – 2006**

2004 – 2006 Vice President Pacific Operations

2001 – 2004 Northwest Profit Center Manager

Regional Program Manager, ENSR International **1999 – 2001**

Various capacities, Philip Services **1993 – 1999**

1997 – 1999 Director of Engineering and Regulatory Affairs

1995 – 1997 Materials Manager

1993 – 1995 Plant Manager

Various capacities, Rhone Poulenc Chemicals **1986 – 1993**

1991 – 1993 Maintenance Manager

1988 – 1991 Operations Superintendent

1986 – 1988 Process Engineer

Synergistic Activities

Issaquah School Board, Issaquah, Washington (publicly elected)

Washington Wildlife and Recreation Coalition Board

Myles Grotbo, Project Manager - AMEC

Myles Grotbo will serve as the project manager for AMEC Geomatrix. Mr. Grotbo is a Principal Geologist with AMEC and currently serves as the unit manager for its New Mexico and Montana operations. He is charged with organizing and promoting AMEC Geomatrix's natural resource, National Environmental Policy Act (NEPA), permitting, and international services, as well as managing the technical aspects of several projects. His technical background includes his role as project manager for a multimillion-dollar environmental and social baseline investigation in Ghana, West Africa, being conducted to satisfy the International Finance Council (IFC) World Bank guidelines and the requirements of the Ghanaian Environmental Protection Agency. He has also managed several mine projects domestically focused on collection of high-quality, legally defensible environmental and social baseline data for a variety of mining clients. His 30 years of experience managing environmental-related projects for a variety of industries will serve Sapphire Energy Company well in ensuring the IABR project is conducted in accordance with the highest standards.

AMEC's Role at the IABR Project

AMEC Geomatrix will provide civil engineering, permitting, design, procurement and construction services to the IABR. The company is a diversified technical and engineering firm that specializes in helping their clients manage and solve tough, complex challenges. Their capabilities include environmental and civil engineering, geotechnical engineering, chemical and process engineering, air quality and toxicology, risk assessment, natural resources, and applied environmental and earth sciences. Specialized services provided to private/public clients include numerical groundwater modeling, geochemical modeling, environmental forensics, litigation support, regulatory interaction, indoor air/vapor intrusion, bioremediation, phytoremediation, in situ remediation, and geographic information systems. Their team consists of more than 500 scientific, technical and support professionals. AMEC Geomatrix is supported by their parent company, AMEC plc, which has 24,000 employees in 30 countries.

Education and Training

Bachelor of Science, Earth Science (Geology and Hydrology) **1978**

Montana State University, Bozeman, Montana

Professional Experience

Principal Geologist, AMEC Geomatrix **2005-Present**

Senior Vice President, Tetra Tech, Inc. **2002-2005**

Senior Hydrogeologist, Senior Project Manager, Maxim Technologies, Inc. **1983-2002**

Project Hydrogeologist, Hydrometrics, Inc. **1980-1983**

Staff Geologist, US Army Corps of Engineers **1978-1980**

Publications

1. **M. Grotbo**. "Groundwater Characteristics of the Area I Operable Unit, Silver Bow Creek CERCLA Site, Butte, Montana." Abstracts with Programs, Northern Rocky Mountain Groundwater Congress, Butte, MT. 1990.

2. D. Stiller and **M. Grotbo**. "Regulatory Guidelines for Measuring Erosion and Sediment Yield on Reclaimed Surface Mined Lands in Montana." Abstracts with Programs, Association of American Geographers, Washington, D.C. 1984.

3. **M. Grotbo** and D. Stiller. "Groundwater Contamination in Abandoned Mine Lands near Corbin, Montana." *Montana Bureau of Mines and Geology, Special Publication.* n. 91. 1984.

4. D. Stiller and **M. Grotbo**. "Computer Simulation of Mining and Irrigation Impacts on the Tongue River, Southeastern Montana." *Montana Bureau of Mines and Geology, Special Publication.* n. 91. 1984.

Synergistic Activities

Western Environmental Trade Association

National Groundwater Association

Redacted Exemption 4

Redacted Exemption 4

Ramin Abhari, Engineer – Dynamic Fuels

Ramin Abhari works as a Senior Process Engineer III at Dynamic Fuels. Since 2004 he has managed I.P. initiatives and led the technology development activities for the Bio-Synfining™ process. He designed process and analyzed economics for converting liquefied petroleum gases (LPG) to synthetic jet fuel and directed the Research & Development program to develop process for converting naphtha-range paraffins to middle distillates.

Prior to joining Dynamic Fuels, Ramin led process development efforts for new specialty polyolefin product line for Exxon Mobil. He also worked as a Senior Engineer for W. R. Grace & Co. where he Patented low pressure hydrogenation process for HMDA (hexamethylene diamine) and presented findings formally at major catalyst customers. Ramin received his M.S. in Chemical Engineering from the City College of New York and a B.S. in Chemistry from the College of Wooster. He is a senior member of the American Institute of Chemical Engineers and a Member of the American Chemical Society.

Dynamic Fuels' Role at the IABR Project

Dynamic Fuels are the consortia's pre-refining and refining partners. They are responsible for processing algae oil to finished jet fuel and diesel product. Dynamic Fuels II LLC (DFII) is well equipped to operate and maintain the renewable fuels facility proposed – the Geismar, Louisiana, Bio-Synfining™ plant. The Geismar plant is a $138 million, 5000 barrel per day (75 million gallon per year), brownfield construction plant scheduled for commercial operations in 2010. DFII applies the experience and expertise of both parent companies, Tyson Foods, Inc. and Syntroleum Corporation, as well as the experience of developing the first renewable synthetic fuels facility in the United States.

Dynamic Fuels II LLC is directed by a Management Committee composed of four senior executives, two from each parent company. The Management Committee reaches back into the parent organizations to tap highly qualified and experienced staff to address a wide variety of discipline specific topics and issues.

Education and Training

Master of Science, Chemical Engineering, City College of New York **1990**

Bachelor of Science, Chemistry, College of Wooster **1987**

Professional Experience

Senior Process Engineer III, Dynamic Fuels **2004 – Present**

Various capacities, Exxon Mobil Corporation **1997 – 2004**

Staff Engineer, Baytown Technology & Engineering Complex

Senior Engineer, Baton Rouge Chemical Technology Department

Various capacities, General Electric Company **1994 – 1997**

Process Technology Specialist, GE Plastics Europe

Lead Process Engineer, GE Specialty Chemicals

Senior Engineer, W.R. Grace & Co. **1990 – 1994**

Patents

U.S. Patent 7,294,261, assigned to Exxon Mobil Corporation; 2007.

U.S. Patent 5,105,015 "Synthesis of non-cyclic aliphatic polyamines" assigned to W. R. Grace & Co.; April 4, 1992.

Publications

Abhari, R.; Isaacs, L. L. "Drying Kinetics of Lignite, Subbituminous Coals, and High-Volatile Bituminous Coals"; *Energy & Fuels*, 1990 (4), 448-452.

Ngeyi, S.P.; Abhari, R.; Westrum, E. F. "Thermodynamics of alkali alkanoates"; *J. Chem. Thermodynamics*, Oct. 1993 (25), 1197-1203.

L. L. Isaacs, R. Abhari, R. Ledesman, E. Tsafantakis "Response of Argonne Premium Coals to heat"; *Energy and Fuels*, **6**, 242 (1992).

Abhari, R. "Isoparaffinic Biofuels"; *Prepr. Pap. Am. Chem. Soc., Div. Fuel Chem.,* 2008 (1), 53.

Synergistic Activities

American Institute of Chemical Engineers

Member, American Chemical Society

Shrikar Chakravarti, Praxair Senior Development Associate

While at Praxair Shrikar developed technology for cost-effective capture of CO_2 from flue gas. He has also identified novel concepts for significantly reducing capital and operating costs for recovering CO_2 from flue gases using amines technology and led construction of the amines pilot plant. He developed data package to quantify magnitude of process improvement and strengthened the overall intellectual property portfolio (5 granted patents, 3 patent applications) which have been licensed to 2 E&C companies in 2002 and to Dow Chemicals in 2008.

Praxair's Role at the IABR Project

Praxair will supply carbon dioxide feedstock to the IABR. Praxair is a global, Fortune 300 company that supplies atmospheric, process and specialty gases. Praxair's primary products are:

- atmospheric gases -- oxygen, nitrogen, argon and rare gases (produced when air is purified, compressed, cooled, distilled and condensed), and
- process & specialty gases -- carbon dioxide, helium, hydrogen, semiconductor process gases, and acetylene (produced as by-products of chemical production or recovered from natural gas).

Education and Training

Ph.D. in Chemical Engineering, University of Wisconsin in Madison

M.S. in Chemical Engineering, University of Texas in Austin

B.S. in Chemical Engineering, Indian Institute of Technology in Bombay, India

Professional Experience

Senior Development Associate for Energy R&D, Praxair	**2009-Present**
Senior R&D Manage for Electronics Supply Systems R&D, Praxair	**2004-2008**
Six Sigma Black Belt for R&D, Praxair	**2002-2004**
Development Associate for CO_2 R&D, Praxair	**1997-2002**

Publications

1. **S. Chakravarti**, A. Gupta and B. Hunek, "Advanced Technology for the Capture of Carbon Dioxide from Flue Gases", Presented at the 1st National Conference on Carbon Sequestration, Washington DC, May 15 – 17, 2001.

Patents

US Patents: 6,146,603; 6,165,433; 6,174,506; 6,497,852; 6,592,829

Redacted Exemption 4

Redacted Exemption 4

Melih Ozbilgin, PhD, Brown and Caldwell Project Officer

Dr. Melih Ozbilgin will be serving as the primary project officer for Brown and Caldwell (BC). Melih is a Water Resources Practice Leader with 26 years of experience with municipal, industrial and federal clients. Melih's background includes clean water, recycled water, and wastewater projects with special emphasis on water supply and treatability studies, and design and implementation of treatment and delivery systems. He is a recognized expert in the development and application of analytical and numerical techniques to evaluate groundwater supply and treatment.

Brown and Caldwell's Role at the IABR Project

Brown and Caldwell (BC) will consult in the areas of dewatering technology, water chemistry, and civil engineering at the IABR. For algae-to-biofuels projects, BC provides expertise from the water and wastewater industry in the areas of algal growth facilitation in ponds and liquid-solids separation for biomass removal. The BC team realizes that the economic viability and positive energy balance of large-scale algal production are the ultimate goals. Feasibility of large-scale algal production relies on the ability to keep operational costs low while still meeting performance goals. BC's strengths are the qualifications and experience of their people that include:

- Design of oxidation ponds and ring-type oxidation ditches
- Design of three of the four largest conventional facultative pond systems in the world (Sunnyvale, Stockton, and Davis)
- Industry leaders in liquid solids separation processes, including Dissolved Air Flotation (DAF)
- Knowledge of flocculant chemicals currently on the market for wastewater treatment solids separation
- Knowledge of mechanical systems for efficient mixing and chemical addition
- Certified professional estimators with approximately three decades of cost estimating experience and constructability reviews in the water and wastewater industry

Education and Training

Ph.D. Civil and Environmental Engineering **1982**

University of Rhode Island, Kingston, Rhode Island

M.S. Civil and Environmental Engineering **1980**

University of Rhode Island, Kingston, Rhode Island

M.S. Community Planning **1979**

University of Rhode Island, Kingston, Rhode Island

B.S. Architecture **1974**

Partner Resumes

Integrated Algal Biorefinery (IABR)

Aegean University, Lesvos, Greece

Professional Experience

Project Manager, Integrated Regional Water Management Plan (IRWMP) **Present**

Phase 2 Implementation, West Basin Municipal Water District, Los Angeles, California

Melih is managing an unprecedented effort — in the largest county in the nation — to address water quality, water supply and environmental issues through collaborative effort among hundreds of organizations including cities, the county, water supply agencies, non-profits and environmental groups.

Principal-in-Charge, Echo Park Lake Rehabilitation Project **Present**

City of Los Angeles, Bureau of Engineering, Los Angeles, California

The project includes pre-design, design, and design support services during construction for rehabilitation of the Echo Park Lake. The project includes extensive in-lake basin improvements; in-lake vegetation, habitat, and park improvements; reviewing and validating the original facility planning documents; parkland structural BMP development oriented on improving water quality in both the lake and the Los Angeles River Watershed achieving significant reduction in pollutants to meet current and future TMDL requirements.

Principal-in-Charge, Shortage Guidelines Phase 2-5 **Completed**

United States Bureau of Reclamation (USBR), California

Melih oversaw the development of Colorado River interim guidelines for lower basin shortages, coordinated operations for Lake Powell and Lake Mead, and prepared a final Environmental Impact Statement for the USBR, Upper and Lower Colorado Regions. These strategies identify those circumstances under which the Secretary of the Department of Interior would reduce annual water deliveries under shortage conditions and the manner in which annual river and reservoir operations would be modified.

Program Manager, Groundwater Investigation and Modeling **Completed**

West Basin Municipal Water District, Los Angeles, California

Melih provided technical oversight for all aspects of the project, which incorporated state-of-the-art field investigation techniques with computer-aided data management, quality control and interpretation. He also oversaw the development of seven two- and three dimensional Groundwater flow and solute transport models for basin management and adjudication.

Paola Bandini, PhD, P.E. New Mexico State University

Dr. Paola Bandini is an Associate Professor of Civil Engineering at New Mexico State University.

New Mexico State University's Role at the IABR Project

IABR Research Abstract

One of the major capital costs associated with the IABR are the materials and construction of the cultivation ponds. Sapphire has developed a pond design that meets the performance metrics of the IABR. Nevertheless, the materials and treatment required to create an impermeable surface is a significant cost that can be further decreased through research and development. New Mexico State University, where Paola Bandini is an Associate Professor, will conduct research on alternative means to alter soil permeability with low cost ground treatments. The pond lining methods can include geotextiles, other synthetic fabrics, soil cement, specialty admixtures and other proprietary products. Parameters that require further investigation include overall water containment, relative permeability, durability, compatibility with planned pond use, installing, serviceability, capital and life cycle economics, scalability, participate in development of preliminary and final technical reports presenting conclusions.

Education and Training

Bachelor of Science, Geology, Universidad de Oriente Venezuela	**1993**
Bachelor of Science, Geological Engineering, Universidad de Oriente Venezuela	**1993**
Master of Science, Civil Engineering, Purdue University	**1999**
PhD, Civil Engineering, Purdue University	**2003**

Professional Experience

Various capacities, New Mexico State University	**2002 – Present**
2008 – Present Associate Professor, Civil Engineering Department	
2002 – 2008 Assistant Professor, Civil Engineering Department	
Profesor Instructor, School of Earth Sciences, Universidad de Oriente	**1993 – 2002**
Various capacities, Purdue University	**1998 – 2001**
1999 – 2001 Teaching Assistant, School of Civil Engineering	
1998 – 2000 Graduate Research Assistant, School of Civil Engineering	

Synergistic Activities

Licensed Professional Engineer

American Society of Civil Engineers,

New Mexico Section of the ASCE

International Association for Computer Methods and Advances in Geomechanics

The Geo-Institute

Society of Women Engineers

U.S. University Council for Geotechnical Education and Research

Colegio de Ingenieros de Venezuela

Transportation Research Board

Partner Resumes

Integrated Algal Biorefinery (IABR)

Scott C. James, PhD – Sandia National Laboratory

Dr. James is a Principal Member of the Technical Staff at Sandia National Laboratories. He specializes in Thermal / Fluid Science and Engineering.

Sandia National Laboratory's Role at the IABR Project

IABR Research Abstract

The mechanical design of an algae cultivation pond is a large determinant of its biomass productivity, capital and operating costs. For example, the energy input for agitation and gas exchange are highly dependent on the fluid mechanics of the pond system. Detailed modeling of the mechanical and chemical aspects of the pond designs is essential to achieving the performance metrics for the project. While Sapphire's design and development effort will deliver successful designs for the IBAR project, the design should be further modeled and studied throughout the project, and especially during its first year of operation. Sandia National Laboratories has exceptional expertise in modeling the mechanics and chemistry in large fluidic systems that could be further applied to the design and study of algae cultivation ponds. The deliverables of this project would be 1) a model of Sapphire's pond design and 2) a comparison of real world performance to model predictions, culminating in an improved understanding of how pond design influences performance, which would provide guidance in the design and development of the full commercial scale cultivation ponds.

Education and Training

Bachelor of Science, Engineering Science, University of California, San Diego	**1993**
Master of Science, Mechanical Engineering , University of California, San Diego	**1994**
PhD, Engineering, University of California, Irvine	**2001**

Professional Experience

Various capacities, Sandia National Laboratories **2001 – Present**

2007 – Present Principal Member of the Technical Staff, Thermal / Fluid Science and Engineering

2006 – 2007 Senior Member of the Technical Staff, Thermal / Fluid Science and Engineering

2002 – 2006 Senior Member of the Technical Staff, Geohydrology

2001 – 2002 Senior Member of the Technical Staff, Performance Assessment & Decision Analysis

Instructor, The Princeton Review, Physics for the MCAT **1997 – 2001**

1995 - 2001

Various capacities, University of California, Irvine

1999 – 2001 Teaching Assistant Consultant, School of Engineering

1996 – 2001 Teaching Associate, Civil and Environmental Engineering

1995 – 2001 Teaching and Research Assistant, Civil and Environmental Engineering

Publications

DICKINSON, J. E., S. C. JAMES, S. W. MEHL, M. C. HILL, S. A. LEAKE, G. A. ZYVOLOSKI, C. C. FAUNT, A.-A. EDDEBBARH, A new ghost-node method for linking different models and initial investigations of heterogeneity and nonmatching grids, Advances in Water Resources, 30(8), 1722 – 1736, DOI: 10.1016/j.advwatres.2007.01.004, 2007.

JAMES, S. C., T.K. BILEZIKJIAN, and C.V.CHRYSIKOPOULOS, Contaminant transport in a fracture with spatially variable aperture in the presence of monodisperse and polydisperse colloids, Stochastic Environmental Research and Risk Assessment, 19(4), 266 – 279, DOI: 10.1007/s00477-004-0231-3, 2005.

JAMES, S. C. and V. BORIAH, Modeling algae growth in an open-channel raceway, submitted to Bioresource Technology, 2009.

JAMES, S. C. and C. V. CHRYSIKOPOULOS, Dense colloid transport in a bifurcating fracture, Journal of Colloid and Interface Science, 270(1), 250 – 254, 2004.

JAMES, S. C. and C. V. CHRYSIKOPOULOS, Effective velocity and effective dispersion coefficient for finitely sized particles flowing in a uniform fracture, Journal of Colloid and Interface Science, 263(1), 288 – 295, 2003.

JAMES, S. C. and C. V. CHRYSIKOPOULOS, Analytical solutions for monodisperse and polydisperse colloid transport in uniform fractures, Colloids and Surfaces A: Physicochemical and Engineering Aspects, 226(1 – 3), 101 – 118, 2003.

JAMES, S. C. and C. V. CHRYSIKOPOULOS, An efficient particle tracking equation with specified spatial step for the solution of the diffusion equation, Chemical Engineering Science, 56(23), 6535 – 6543, 2001.

Synergistic Activities

American Geophysical Union (AGU), American Society of Civil Engineers (ASCE), Associate Editor for Ground Water, Level ‘Q’ Security Clearance

PROJECT ABSTRACT

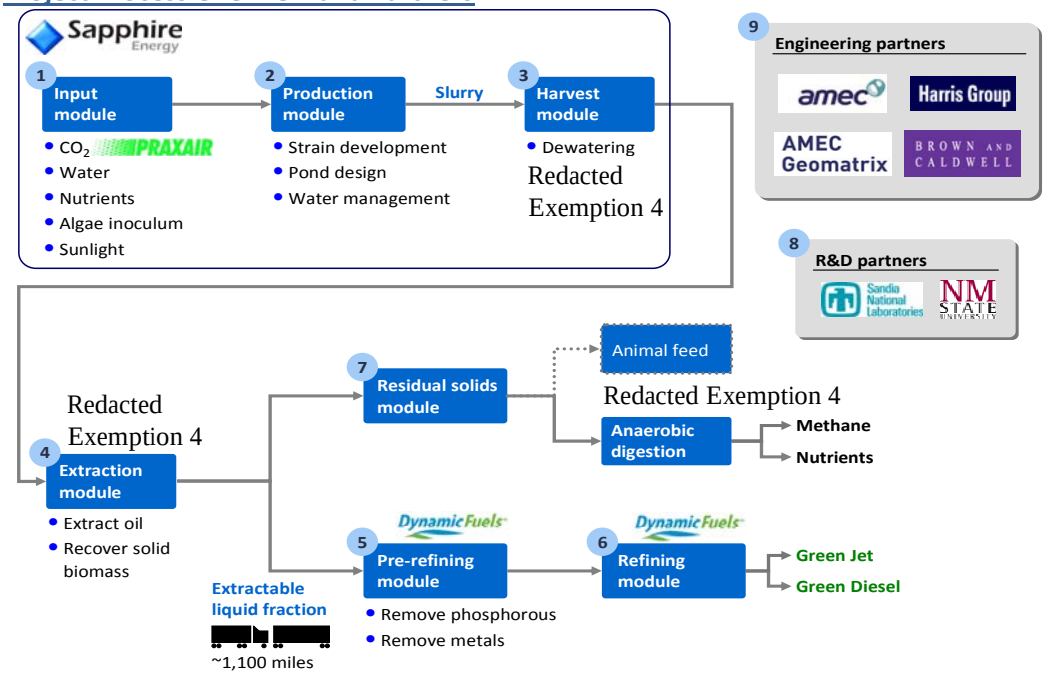
Project Director: Brian Goodall, Ph.D., Vice President of Downstream Technology
Project title: Sapphire Integrated Algal Biorefinery (IABR)

Project Objectives

The overall objective of the IABR is to demonstrate the technical and economic feasibility of the algae-to-drop-in green fuels (e.g., Jet-A, ASTM-certified No. 2 diesel) process that will form the basis for the development of a series of commercial scale biorefineries. The aims of the IABR are to:

- Deploy the algae-to-green fuels process at the pre-commercial scale
- Integrate the key processes from in the entire production chain from feedstock to transportation fuel
- Continue to reduce capital and operational costs through an ongoing R&D effort

Project Process Overview and Partners



Project Impact

In 2008, approximately 23 million acres of agricultural land for corn growth were used to produce roughly 4% of U.S. transportation fuel. By comparison, the equivalent land area used for algal cultivation – because of the prolific organic biomass productivity advantage algae have over terrestrial plants – would yield over 40% of U.S. transportation fuel needs. The Sapphire IABR will demonstrate feasible economics for producing renewable algae-derived fuels in commercial algal biorefinery (CAB) scale in excess of 10,000 barrels/day of refinable algae oil.

Success at the IABR will facilitate the deployment of multiple CABs across the United States, scaling domestic fuel production to over 1 million barrels per day of algae oil in the United States by 2030, a significant step towards the President's call for a 10 million barrel/day reduction in foreign oil consumption by 2030.

Existing Facility (Sapphire Pilot Testing Site)

Existing Bench, Pilot, or Demonstration Facility Applicant is currently operating as the basis for the Proposed Facility

General Plant Information		
Name	**Sapphire Pilot Test Site (PTS)**	
Facility Location	**Las Cruces, NM**	
Total Operating Hours as of 6/15/2009		
Operating Days per Year		
Conversion Technology Type		
Short Technology Description	Redacted Exemption 4	
Scale up Size from Previous Facility **(area under cultivation)**		
Requested Dollars from DOE		
Total Facility Capital Cost		
Cost Share Percent		
Industrial Project Partner(s)		
National Lab Project Partner(s)		
Academic Project Partner(s)		
Other Project Partner(s)		

Products (denote Primary Product in Bold)		1
All Tonnes per year are on a dry basis in the "Product" category		
Figures represented assume consistent operation at capacity	**Units**	
Gross Production Rate **(of algal oil primary product)**	Gal/year	
	Tonnes/year	
Net Production Rate **(of algal oil refined to renewable diesel)**	Gal/year	
	Tonnes/year	
Energy Value **(LHV per gallon refined to renewable diesel)**	Btu/Gal	Redacted Exemption 4
	Btu/Ton	
Break Even Sales Price **(of <u>renewable diesel</u> per marginal acre)**	$/Gal	
	$/Tonne	
Yield **(of <u>renewable diesel</u>)**	Gal/Tonne Ash Free Dry Weight Algae	
	Tonnes Product/Tonne Ash Free Dry Weight Algae	

Waste Streams		
Production Rate	Tonne/year	
Cost of Disposal	$/Tonne	

Feedstock (CO_2)		
	Units	
CO_2 from supplemented sources (i.e., not atmospheric)	Tonnes/Year	
	Gal/Year	
Moisture Content - Delivered	Percent	
Percent Foreign Material - Delivered	Percent	
High Heating Value (dry basis)	Btu/lb	
Transportation Method (% of feedstock per method)		
	Truck	
	Train	
	Barge	
	Other	
Transportation Charge		
	Truck ($/Tonne)	
	Train ($/Tonne)	
	Barge ($/Tonne)	
	Other ($/Tonne)	
Storage Charge (covered in transportation charge)		
Expected cost of feedstock at process throat		

Consumables	Consumption Rate	Process Chemicals & Nutrients	Utilities	Other Process Consumables
	Primary Product (assuming algal oil refined into diesel)			
	$/MMBtu of Product			
	kWh/MMBtu of Product			
	MMBtu/MMBtu of Product			
	Gal/MMBtu of Product			
ProForma Information				
	$/kWh			
	$/MMBtu Consumed			
	$/MMBtu Produced			
	Max Utilization (availability, days and %)			
	Operational Uptime (capacity factor)			
	Ramp-up percent during 1st 12 months			
	Land Aquisition Costs			
Cost and Schedule Information (formatted similar to 'Proposed Facility' and 'Future Commercial' tabs for consistency)				
	Budget Information			
	Administrative			
	Land, Structures, rights-of-way, appraisals			
	Relocation expenses and payments			
	Architectural and engineering fees (EPC)			
	Other Architectural and engineering fees			
	Project inspection fees			
	Site Work			
	Demolition and removal			
	Construction (EPC)			
	Equipment			
	Miscellaneous			
	Startup			
	Working capital			
	Operation			
	SUBTOTAL			
	Contingency ($)			
	Contingency (%)			
	Project Income			
	Capital Costs			
	Construction (EPC)			
	Equipment			
	Miscellaneous (explain)			
	Capital Costs per Marginal Gallon Diesel			
	Capital Costs per Marginal Ton Diesel			
	Estimated Post completion capital costs			
	Operational Costs: Primary Product (algal oil)			
	Feedstock costs per year			
	Transportation Charges per year			
	Chemical & Nutrient Cost per year			
	Utility Costs per year			
	Maintenance Costs per year			
	Insurance Costs per year			
	Labor Costs per Year			
	Other Costs per Year			
	Operational Cost per Marginal Gallon Diesel			
	Operational Cost per Marginal Ton Primary Diesel			
	Expected duration of operation (months)			
	Expected cost per month of operation			
	Startup costs			
	Costs			

Redacted Exemption 4

Other costs (explain)	
Subtotal	
Other Income (explain)	
Total	

Redacted Exemption 4

Schedule (days)	
Contingency	
Award	
	Start
Total Project duration (inception of project team to completion of independent engineer performance test)	
Procurement	
Engineering	
Construction	
Commissioning	
Startup	
Shakeout	
Operations - Piloting	
Total Project duration	

Proposed Facility (Sapphire Integrated Algal Biorefinery (IABR))

General Plant Information		
Name	**Sapphire Integrated Algal Biorefinery IABR**	
Facility Location	**Columbus, New Mexico**	
Operating Days per Year	Redacted Exemption 4	
Conversion Technology Type		
Short Technology Description	**Photosynthetic algae production process utilizing atmospheric & anthropogenic CO_2 feedstock and the production of refinable algal oil into fungible, hydrocarbon transportation fuel**	
Scale up Size from Previous Facility **(area under cultivation)**		
Requested Dollars from DOE	50,000,000	Other eligible project costs incurred during project lifetime increase the
Total Proposed Facility Capital Cost	Redacted Exemption 4	
Cost Share Percent		
Industrial Project Partner(s)		
National Lab Project Partner(s)		
Academic Project Partner(s)		
Other Project Partner(s)		

Products (denote Primary Product in Bold)		1 (Year 2013, post ramp-up)	2	3	4
All Tonnes per year are on a dry basis in the "Product" category					
	Units				
Gross Production Rate **(of algal oil primary product)**	Gal/year				
	Tonnes/year				
Net Production Rate **(of algal oil refined to renewable diesel)**	Gal/year	Redacted Exemption 4			
	Tonnes/year				
Energy Value **(LHV per gallon refined to renewable diesel)**	Btu/Gal				
	Btu/Ton				
Break Even Sales Price **(of <u>renewable diesel</u> per marginal acre)**	$/Gal				
	$/Tonne				
Yield **(of <u>renewable diesel</u>)**	Gal/Tonne Ash Free Dry Weight Algae				
	Tonnes Product/Tonne Ash Free Dry Weight Algae				

Waste Streams (waste cost of processed residual biomass attributed to digestion partner over time)		1	2	3	4
Production Rate	Tonne/year				
Cost of Disposal	$/Tonne	Redacted Exemption 4			

Feedstock (CO_2)		1	2	3	4
	Units				
CO_2 from supplemented sources (i.e., not atmospheric)	Tonnes/Year				
	Gal/Year				
Moisture Content - Delivered	Percent				
Percent Foreign Material - Delivered	Percent				
High Heating Value (dry basis)	Btu/lb				
Transportation Method (% of feedstock per method)		Redacted Exemption 4			
	Truck				
	Train				
	Barge				
	Other				
Transportation Charge (Delivered and stored cost)					
	Truck ($/Tonne)				
	Train ($/Tonne)				
	Barge ($/Tonne)				
	Other ($/Tonne)				
Storage Charge (covered in transportation charge)					
Expected cost of feedstock at process throat					

nsumables	Consumption Rate	Process Chemicals & Nutrients	Utilities	Other Process Consumables	Other 1
	Primary Product (year 4, assuming algal oil refined into diesel)				
	$/MMBtu of Product				
	kWh/MMBtu of Product	Redacted Exemption 4			
	MMBtu/MMBtu of Product				
	Gal/MMBtu of Product				

ProForma Information	Primary Product (year 4, assuming algal oil refined into diesel)		
	$/kWh	0.1	
	$/MMBtu Consumed		
	$/MMBtu Produced	Redacted Exemption 4	
	Max Utilization (availability, days and %)		
	Operational Uptime (capacity factor)		
	Ramp-up percent during 1st 12 months		

Land Aquisition Costs ($)

Cost and Schedule Information

Budget Information (construction year 0)
Administrative (CM)
Land, Structures, rights-of-way, appraisals
Relocation expenses and payments
Architectural and engineering fees (CM)
Other Architectural and engineering fees
Project inspection fees
Site Work
Demolition and removal
Construction
Equipment
Miscellaneous
Startup
Working capital
Operation
SUBTOTAL
Contingency ($)
Contingency (%)
Project Income

Capital Costs
Construction
Equipment (installed)
Miscellaneous (explain)

Capital Costs per Marginal Gallon Diesel at year 4*
Capital Costs per Marginal Ton Diesel at year 4*

Estimated Post completion capital costs

Operational Costs at year 4
Feedstock costs per year
Transportation Charges per year
Chemical & Nutrient Cost per year
Utility Costs per year
Maintenance Costs per year
Insurance Costs per year
Labor Costs per Year
Other Costs per Year
Operational Cost per Marginal Gallon Diesel at year 4
Operational Cost per Marginal Ton Diesel at year 4
Expected duration of operation (months)
Expected cost per month of operation

Startup costs
Costs
Other costs (explain)
Subtotal
Other Income (explain)
Total

Schedule (days)
Contingency
Award

Total Project duration (inception of project team to completion of independent engineer performance test)
Procurement
Engineering
Construction
Commissioning
Startup
Shakeout
Operations
Total Project duration

Redacted Exemption 4

Future Facility (Sapphire Commercial Algal Biorefinery)

Facility that will be constructed following successful operation of the Proposed Facility

General Plant Information	
Name	**Sapphire Commercial Algal Biorefinery (CAB)**
Facility Location	**Columbus, New Mexico**
Operating Days per Year	Redacted Exemption 4
Conversion Technology Type	
Short Technology Description	**Photosynthetic algae production process utilizing atmospheric & anthropogenic CO_2 feedstock and the production of refinable algal oil into fungible, hydrocarbon transportation fuel**
Scale up Size from Previous Facility **(area under cultivation)**	Redacted Exemption 4
Total Proposed Facility Capital Cost	
Cost Share Percent	
Industrial Project Partner(s)	
National Lab Project Partner(s)	
Academic Project Partner(s)	
Other Project Partner(s)	

Products (denote Primary Product in Bold)		1 (Year 2019, post ramp-up)	2	3	4
All Tonnes per year are on a dry basis in the "Product" category					
	Units				
Gross Production Rate **(of algal oil primary product)**	Gal/year				
	Tonnes/year				
Net Production Rate **(same as gross, algal oil is sold)**	Gal/year	Redacted Exemption 4			
	Tonnes/year				
Energy Value **(LHV per gallon if refined to renewable diesel)**	Btu/Gal				
	Btu/Ton				
Break Even Sales Price **(of algal oil product)**	$/Gal				
	$/Tonne				
Yield **(of algal oil product)**	Gal/Tonne Ash Free Dry Weight Algae				
	Tonnes Product/Tonne Ash Free Dry Weight Algae				

Waste Streams (waste cost of processed residual biomass attributed to digestion partner)		1	2	3	4
Production Rate	Tonne/year	Redacted Exemption 4			
Cost of Disposal	$/Tonne				

Feedstock		1	2	3	4
	Units				
CO_2 from supplemented sources (i.e., not atmospheric)	Tonnes/Year	Redacted Exemption 4			
	Gal/Year				
Moisture Content - Delivered	Percent				
Percent Foreign Material - Delivered	Percent				
High Heating Value (dry basis)	Btu/lb				
Transportation Method (% of feedstock per method)					
	Truck				
	Train				
	Barge				
	Other (power plant emissions offtake)				
Transportation Charge (Delivered and stored cost)					
	Truck ($/Tonne)				
	Train ($/Tonne)				
	Barge ($/Tonne)				
	Other ($/Tonne)				
Storage Charge (covered in transportation charge)					
Expected cost of feedstock at process throat					

Consumables	Consumption Rate	Process Chemicals & Nutrients	Utilities	Other Process Consumables	Other 1
	Primary Product (year 4, assuming algal oil refined into diesel)				
	$/MMBtu of Product	Redacted Exemption 4			
	kWh/MMBtu of Product				
	MMBtu/MMBtu of Product				
	Gal/MMBtu of Product				

ProForma Information	Primary Product (year 4, assuming algal oil refined into diesel)
	$/MMBtu Consumed
	$/MMBtu Produced
	Max Utilization (availability, days and %)
	Operational Uptime (capacity factor)
	Ramp-up percent during 1st 12 months
	Land Aquisition Costs ($)

Redacted Exemption 4

Redacted Exemption 4

Cost and Schedule Information

Budget Information (construction year 0)

Administrative	
Land, Structures, rights-of-way, appraisals	
Relocation expenses and payments	
Architectural and engineering fees (EPC)	
Other Architectural and engineering fees	
Project inspection fees	
Site Work	
Demolition and removal	
Construction (EPC)	
Equipment	
Miscellaneous	
Startup	
Operation	
SUBTOTAL	
Contingency ($)	
Contingency (%)	
Project Income	

Redacted Exemption 4

Capital Costs

Construction (EPC)	
Equipment	
Miscellaneous (explain)	
Capital Costs per Gallon Algal Oil at year 4	
Capital Costs per Ton Algal Oil at year 4	
Estimated Post completion capital costs	

Operational Costs at year 4

Feedstock costs per year	
Transportation Charges per year	
Chemical & Nutrient Cost per year	
Utility Costs per year	
Maintenance Costs per year	
Insurance Costs per year	
Labor Costs per Year	
Other Costs per Year	
Operational Cost per Gallon Algal Oil at year 4	
Operational Cost per Ton Algal Oil at year 4	
Expected duration of operation (months)	
Expected cost per month of operation	

Startup costs

Costs	
Other costs (explain)	
Subtotal	
Other Income (explain)	
Total	

Schedule (days)

Contingency	
	Start
Total Project duration (inception of project team to completion of independent engineer performance test)	
Procurement	
Engineering	
Construction	
Commissioning	
Startup	
Shakeout	
Operations	
Total Project duration	

*Marginal Cost Calculation Rationale for Calculating CAPEX and OPEX at the Proposed Facility IABR

Redacted Exemption 4

ASSISTANCE AGREEMENT

1. Award No.	2. Modification No.	3. Effective Date	4. CFDA No.
DE-EE0002884	001	12/29/2009	81.087

5. Awarded To
SAPPHIRE ENERGY, INC.
Attn: DAVID BUTTARO
SAPPHIRE ENERGY
3115 MERRYFIELD ROW
SAN DIEGO CA 921211125

6. Sponsoring Office
Golden Field Office
U.S. Department of Energy
Golden Field Office
1617 Cole Blvd.
Golden CO 80401

7. Period of Performance
12/29/2009
through
09/30/2014

8. Type of Agreement
- ☐ Grant
- ☒ Cooperative Agreement
- ☐ Other

9. Authority
109-58, Energy Policy Act (2005)
109-58, Recovery Act (2009)

10. Purchase Request or Funding Document No.
10EE003168

11. Remittance Address
SAPPHIRE ENERGY, INC.
Attn: DAVID BUTTARO
SAPPHIRE ENERGY
3115 MERRYFIELD ROW
SAN DIEGO CA 921211125

12. Total Amount
Govt. Share: $49,725,000.00

Cost Share : $ Redacted Exemption 4

Total :
$ Redacted Exemption 4

13. Funds Obligated
This action: -$275,000.00

Total :
$49,725,000.00

14. Principal Investigator
Kulinda Davis
Phone: 858-736-1778

15. Program Manager
Carol Christine Sterner
Phone: 303-275-4720

16. Administrator
Golden Field Office
U.S. Department of Energy
Golden Field Office
1617 Cole Blvd.
Golden CO 80401-3393

17. Submit Payment Requests To
OR for Golden
U.S. Department of Energy
Oak Ridge Financial Service Center
P.O. Box 4517
Oak Ridge TN 37831

18. Paying Office
OR for Golden
U.S. Department of Energy
Oak Ridge Financial Service Center
P.O. Box 4517
Oak Ridge TN 37831

19. Submit Reports To

20. Accounting and Appropriation Data
IBR

21. Research Title and/or Description of Project
RECOVERY ACT - SAPPHIRE INTEGRATED ALGAL BIOFINERY (IABR)

For the Recipient		For the United States of America	
22. Signature of Person Authorized to Sign		25. Signature of Grants/Agreements Officer Signature on File	
23. Name and Title	24. Date Signed	26. Name of Officer Melissa Y. Wise	27. Date Signed 03/18/2010

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	DE-EE0002884/001	2	3

NAME OF OFFEROR OR CONTRACTOR
SAPPHIRE ENERGY, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	DUNS Number: 798830688 "Electronic signature or signatures as used in this document means a method of signing an electronic message that-- (A) Identifies and authenticates a particular person as the source of the electronic message; (B) Indicates such person's approval of the information contained in the electronic message; and, (C) Submission via FedConnect constitutes electronically signed documents." The administrative office (administrative contracting activity) for this award/modification/amendment is 03601 from STRIPES. The administrative office (administrative contracting activity) code is needed by the contractor/recipient for reporting to FederalReporting.gov concerning awards made with funding from the American Recovery and Reinvestment Act of 2009 (ARRA or Recovery Act). The purpose of this modification is to deobligate $275,000 budgeted toward Sandia National Laboratory for this project. These funds will be deobligated from this award and sent directly to Sandia National Laboratory. All other terms and conditions remain unchanged. DOE Award Administrator: Molly Hames E-mail: molly.hames@go.doe.gov Phone: 303-275-4864 DOE Project Officer: Christy Sterner E-mail: christy.sterner@go.doe.gov Phone: 303-275-4720 Recipient Business Officer: Kulinda Davis E-mail: kulinda.davis@sapphireenergy.com Phone: 858-736-1778 Recipient Principal Investigator: Kulinda Davis E-mail: kulinda.davis@sapphireenergy.com Phone: 858-736-1778 ASAP: NO Extent Competed: COMPETED Davis-Bacon Act: YES Continued ... Fund: 05794 Appr Year: 2009 Allottee: 31 Report				

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	DE-EE0002884/001	3	3

NAME OF OFFEROR OR CONTRACTOR

SAPPHIRE ENERGY, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Entity: 200835 Object Class: 41000 Program: 1004173 Project: 2004000 WFO: 0000000 Local Use: 0000000 TAS Agency: 89 TAS Account: 0331				

ASSISTANCE AGREEMENT

1. Award No.	2. Modification No.	3. Effective Date	4. CFDA No.
DE-EE0002884	002	12/29/2009	81.087

5. Awarded To	6. Sponsoring Office	7. Period of Performance
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401	12/29/2009 through 09/30/2010

8. Type of Agreement	9. Authority	10. Purchase Request or Funding Document No.
☐ Grant ☒ Cooperative Agreement ☐ Other	109-58, Energy Policy Act 2005 111-5, Recovery Act 2009	10EE003955

11. Remittance Address	12. Total Amount	13. Funds Obligated
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Govt. Share: $49,725,000.00 Cost Share : $85,064,206.00 Total : $134,789,206.00	This action: $0.00 Total : $49,725,000.00

14. Principal Investigator	15. Program Manager	16. Administrator
Jamie E. Moreno Phone: 949-202-4700	Carol Christine Sterner Phone: 303-275-4720	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401-3393

17. Submit Payment Requests To	18. Paying Office	19. Submit Reports To
OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831	OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831	See Attachment 3

20. Accounting and Appropriation Data

IBR

21. Research Title and/or Description of Project

RECOVERY ACT - SAPPHIRE INTEGRATED ALGAL BIOFINERY (IABR)

For the Recipient		For the United States of America	
22. Signature of Person Authorized to Sign		25. Signature of Grants/Agreements Officer Signature on File	
23. Name and Title	24. Date Signed	26. Name of Officer Melissa Y. Wise	27. Date Signed 04/29/2010

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	DE-EE0002884/002	2	3

NAME OF OFFEROR OR CONTRACTOR
SAPPHIRE ENERGY, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	DUNS Number: 798830688 The purposes of this modification are to: 1) Delete and replace the Special Terms and Conditions; 2) Add the Intellectual Property Provisions, CDLB-1003 (Attachment 1); 3) Add the Statement of Project Objectives (Attachment 2); 4) Add the Federal Assistance Reporting Checklist and Instructions, DOE F 4600.2 (Attachment 3); 5) Add the Budget Information, SF-424A (Attachment 4); 6) Add the Requirements For Contingency Funds for Integrated Biorefinery Projects, Appendix (Attachment 5); 7) Approve only Budget Period 1; and 8) Update the Recipient Contacts, as shown below; All other terms and conditions remain unchanged. In Block 7 of the Assistance Agreement, the Period of Performance reflects the beginning of the Project Period through the end of the current Budget Period, shown as 12/29/2009 through 09/30/2010. For multiple Budget Periods, see Special Terms and Conditions, Provision 4, "Award Project Period and Budget Periods." The total amounts reflected in Blocks 12 and 13 of the Assistance Agreement do not include the Federally Funded Research and Development Center (FFRDC) funding amount of $275,000, which will be funded directly. DOE Award Administrator: Molly Hames E-mail: molly.hames@go.doe.gov Phone: 303-275-4864 DOE Project Officer: Christy Sterner E-mail: christy.sterner@go.doe.gov Phone: 303-275-4720 Continued ...				

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	DE-EE0002884/002	3	3

NAME OF OFFEROR OR CONTRACTOR
SAPPHIRE ENERGY, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Recipient Business Officer: Jamie E. Moreno E-mail: jaime.moreno@sapphireenergy.com Phone: 949-202-4700 Recipient Principal Investigator: Jamie E. Moreno E-mail: jaime.moreno@sapphireenergy.com Phone: 949-202-4700 The administrative office (administrative contracting activity) for this award/modification/amendment is 03601 from STRIPES. The administrative office (administrative contracting activity) code is needed by the contractor/recipient for reporting to FederalReporting.gov concerning awards made with funding from the American Recovery and Reinvestment Act of 2009 (ARRA or Recovery Act). "Electronic signature or signatures as used in this document means a method of signing an electronic message that-- (A) Identifies and authenticates a particular person as the source of the electronic message; (B) Indicates such person's approval of the information contained in the electronic message; and, (C) Submission via FedConnect constitutes electronically signed documents." ASAP: NO Extent Competed: COMPETED Davis-Bacon Act: YES Fund: 05794 Appr Year: 2009 Allottee: 31 Report Entity: 200835 Object Class: 41000 Program: 1004173 Project: 2004000 WFO: 0000000 Local Use: 0000000 TAS Agency: 89 TAS Account: 0331				

CDLB-1003
Intellectual Property Provisions (CDLB-1003)
Cooperative Agreement - Special Data Statute
Research, Development, or Demonstration
Large Businesses, State and Local Governments, and Foreign Entities

01. FAR 52.227-1	Authorization and Consent (JUL 1995)-Alternate I (APR 1984)
02. FAR 52.227-2	Notice and Assistance Regarding Patent and Copyright Infringement (AUG 1996) *This clause is not applicable if the award is for less than $100,000, in aggregate.*
03. 10 CFR 600.325 Appendix A	Rights in Data - Programs Covered Under Special Data Statutes (OCT 2003) *If the contracting officer, in consultation with DOE patent counsel and the DOE program official, determines that delivery of limited rights data or restricted computer software is necessary, Alternates I and II may be inserted into the clause after negotiations with the applicant.*
04. FAR 52.227-23	Rights to Proposal Data (Technical) (JUN 1987)
05. FAR 52.227-12	Patent Rights - Waiver (JUL 1996), as modified by 10 C.F.R. 784, DOE Patent Waiver Regulations and U.S. Competitiveness clause

NOTE: In reading these provisions, any reference to “contractor” shall mean “recipient,” and any reference to “contract” or “subcontract” shall mean “award” or “subaward.”

01. FAR 52.227-1 Authorization and Consent (JUL 1995)-Alternate I (APR 1984)

(a) The Government authorizes and consents to all use and manufacture of any invention described in and covered by a United States patent in the performance of this contract or any subcontract at any tier.

(b) The Contractor agrees to include, and require inclusion of, this clause, suitably modified to identify the parties, in all subcontracts at any tier for research and development expected to exceed the simplified acquisition threshold; however, omission of this clause from any subcontract, including those at or below the simplified acquisition threshold, does not affect this authorization and consent.

(End of clause)

02. FAR 52.227-2 Notice and Assistance Regarding Patent and Copyright Infringement (AUG 1996)

(a) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the Contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed under this contract, the Contractor shall furnish to the Government, when requested by the Contracting Officer, all evidence and information in possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Contractor has agreed to indemnify the Government.

(c) The Contractor agrees to include, and require inclusion of, this clause in all subcontracts at any tier for supplies or services (including construction and architect-engineer subcontracts and those for material, supplies, models, samples, or design or testing services) expected to exceed the simplified acquisition threshold at FAR 2.101.

(End of clause)

03. 10 CFR 600.325 Appendix A, Rights in Data - Programs Covered Under Special Data Statutes (OCT 2003)

(a) Definitions

Computer Data Bases, as used in this clause, means a collection of data in a form capable of, and for the purpose of, being stored in, processed, and operated on by a computer. The term does not include computer software.

Computer software, as used in this clause, means (i) computer programs which are data comprising a series of instructions, rules, routines, or statements, regardless of the media in which recorded, that allow or cause a computer to perform a specific operation or series of operations and (ii) data comprising source code listings, design details, algorithms, processes, flow charts, formulae and related material that would enable the computer program to be produced, created or compiled. The term does not include computer data bases.

Data, as used in this clause, means recorded information, regardless of form or the media on which it may be recorded. The term includes technical data and computer software. The term does not include information incidental to administration, such as financial, administrative, cost or pricing or management information.

Form, fit, and function data, as used in this clause, means data relating to items, components, or processes that are sufficient to enable physical and functional interchangeability as well as data identifying source, size, configuration, mating and attachment characteristics, functional characteristics, and performance requirements except that for computer software it means data identifying source, functional characteristics, and performance requirements but specifically excludes the source code, algorithm, process, formulae, and flow charts of the software.

Limited rights data, as used in this clause, means data (other than computer software) developed at private expense that embody trade secrets or are commercial or financial and confidential or privileged.

Restricted computer software, as used in this clause, means computer software developed at private expense and that is a trade secret; is commercial or financial and confidential or privileged; or is published copyrighted computer software; including modifications of such computer software.

Protected data, as used in this clause, means technical data or commercial or financial data first produced in the performance of the award which, if it had been obtained from and first produced by a non-federal party, would be a trade secret or commercial or financial information that is privileged or confidential under the meaning of 5 U.S.C. 552(b)(4) and which data is marked as being protected data by a party to the award.

Protected rights, as used in this clause, mean the rights in protected data set forth in the Protected Rights Notice of paragraph (g) of this clause.

Technical data, as used in this clause, means that data which are of a scientific or technical nature. Technical data does not include computer software, but does include manuals and instructional materials and technical data formatted as a computer data base.

Unlimited rights, as used in this clause, means the right of the Government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose whatsoever, and to have or permit others to do so.

(b) Allocation of Rights

(1) Except as provided in paragraph (c) of this clause regarding copyright, the Government shall have unlimited rights in--

(i) Data specifically identified in this agreement as data to be delivered without restriction;

(ii) Form, fit, and function data delivered under this agreement;

(iii) Data delivered under this agreement (except for restricted computer software) that constitute manuals or instructional and training material for installation, operation, or routine maintenance and repair of items, components, or processes delivered or furnished for use under this agreement; and

(iv) All other data delivered under this agreement unless provided otherwise for protected data in accordance with paragraph (g) of this clause or for limited rights data or restricted computer software in accordance with paragraph (h) of this clause.

(2) The Recipient shall have the right to--

(i) Protect rights in protected data delivered under this agreement in the manner and to the extent provided in paragraph (g) of this clause;

(ii) Withhold from delivery those data which are limited rights data or restricted computer software to the extent provided in paragraph (h) of this clause;

(iii) Substantiate use of, add, or correct protected rights or copyrights notices and to take other appropriate action, in accordance with paragraph (e) of this clause; and

(iv) Establish claim to copyright subsisting in data first produced in the performance of this agreement to the extent provided in subparagraph (c)(1) of this clause.

(c) Copyright

(1) Data first produced in the performance of this agreement. Except as otherwise specifically provided in this agreement, the Recipient may establish, without the prior approval of the Contracting Officer, claim to copyright subsisting in any data first produced in the performance of this agreement. If claim to copyright is made, the Recipient shall affix the applicable copyright notice of 17 U.S.C. 401 or 402 and acknowledgment of Government sponsorship (including agreement number) to the data when such data are delivered to the Government, as well as when the data are published or deposited for registration as a published work in the U.S. Copyright Office. For such copyrighted data, including computer software, the Recipient grants to the Government, and others acting on its behalf, a paid-up nonexclusive, irrevocable, worldwide license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government, for all such data.

(2) Data not first produced in the performance of this agreement. The Recipient shall not, without prior written permission of the Contracting Officer, incorporate in data delivered under this agreement any data that are not first produced in the performance of this agreement and that contain the copyright notice of 17 U.S.C. 401 or 402, unless the Recipient identifies such data and grants to the Government, or acquires on its behalf, a license of the same scope as set forth in subparagraph (c)(1) of this clause; provided, however, that if such data are computer software, the Government shall acquire a copyright license as set forth in subparagraph (h)(3) of this clause if included in this agreement or as otherwise may be provided in a collateral agreement incorporated or made a part of this agreement.

(3) Removal of copyright notices. The Government agrees not to remove any copyright notices placed on data pursuant to this paragraph (c), and to include such notices on all reproductions of the data.

(d) Release, Publication and Use of Data

(1) The Recipient shall have the right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Recipient in the performance of this contract, except to the extent such data may be subject to the Federal export control or national security laws or regulations, or unless otherwise provided in this paragraph of this clause or expressly set forth in this contract.

(2) The Recipient agrees that to the extent it receives or is given access to data necessary for the performance of this agreement which contain restrictive markings, the Recipient shall treat the data in accordance with such markings unless otherwise specifically authorized in writing by the Contracting Officer.

(e) Unauthorized Marking of Data

(1) Notwithstanding any other provisions of this agreement concerning inspection or acceptance, if any data delivered under this agreement bears any restrictive or limiting markings or notices not authorized by this agreement, the Contracting Officer may at any time either return the data to the Recipient or cancel or ignore the markings. However, the following procedures shall apply prior to canceling or ignoring the markings.

(i) The Contracting Officer shall make written inquiry to the Recipient affording the Recipient 30 days from receipt of the inquiry to provide written justification to substantiate the propriety of the markings;

(ii) If the Recipient fails to respond or fails to provide written justification to substantiate the propriety of the markings within the 30-day period (or a longer time not exceeding 90 days approved in writing by the Contracting Officer for good cause shown), the Government shall have the right to cancel or ignore the markings at any time after said period and the data will no longer be made subject to any disclosure prohibitions.

(iii) If the Recipient provides written justification to substantiate the propriety of the markings within the period set in subdivision (e)(1)(i) of this clause, the Contracting Officer shall consider such written justification and determine whether or not the markings are to be cancelled or ignored. If the Contracting Officer determines that the markings are authorized, the Recipient shall be so notified in writing. If the Contracting Officer determines, with concurrence of the head of the contracting activity, that the markings are not authorized, the Contracting Officer shall furnish the Recipient a written determination, which determination shall become the final agency decision regarding the appropriateness of the markings unless the Recipient files suit in a court of competent jurisdiction within 90 days of receipt of the Contracting Officer's decision. The Government shall continue to abide by the markings under this subdivision (e)(1)(iii) until final resolution of the matter either by the Contracting Officer's determination become final (in which instance the Government shall thereafter have the right to cancel or ignore the markings at any time and the data will no longer be made subject to any disclosure prohibitions), or by final disposition of the matter by court decision if suit is filed.

(2) The time limits in the procedures set forth in subparagraph (e)(1) of this clause may be modified in accordance with agency regulations implementing the Freedom of Information Act (5 U.S.C. 552) if necessary to respond to a request there under.

(f) Omitted or Incorrect Markings

(1) Data delivered to the Government, without any restrictive or limiting markings or notices authorized by this agreement, shall be deemed to have been furnished with unlimited rights, and the Government assumes no liability for the disclosure, use, or reproduction of such data. However, to the extent the data has not been disclosed without restriction outside the Government, the Recipient may request, within 6 months (or a longer time approved by the Contracting Officer for good cause shown) after delivery of such data, permission to have notices placed on qualifying data at the Recipient's expense, and the Contracting Officer may agree to do so if the Recipient--

(i) Identifies the data to which the omitted notice is to be applied;

(ii) Demonstrates that the omission of the notice was inadvertent;

(iii) Establishes that the use of the proposed notice is authorized; and

(iv) Acknowledges that the Government has no liability with respect to the disclosure, use, or reproduction of any such data made prior to the addition of the notice or resulting from the omission of the notice.

(2) The Contracting Officer may also:

(i) Permit correction at the Recipient's expense of incorrect notices if the Recipient identifies the data on which correction of the notice is to be made, and demonstrates that the correct notice is authorized; or

(ii) Correct any incorrect notices.

(g) Rights to Protected Data:

(1) The Recipient may, with the concurrence of DOE, claim and mark as protected data, any data first produced in the performance of this award that would have been treated as a trade secret if developed at private expense. Any such claimed "Protected Data" will be clearly marked with the following Protected Rights Notice, and will be treated in accordance with such Notice, subject to the provisions of paragraphs (e) and (f) of this clause.

PROTECTED RIGHTS NOTICE
These protected data were produced under Agreement No. DE-EE0002884 with the U.S. Department of Energy and may not be published, disseminated, or disclosed to others outside the Government until, unless express written authorization is obtained from the recipient. Upon expiration of the period of protection set forth in this Notice, the Government shall have unlimited rights in this data. This Notice shall be marked on any reproduction of this data, in whole or in part.
(End of notice).

(2) Any such marked Protected Data may be disclosed under obligations of confidentiality for the following purposes:
(a) For internal DOE evaluation and planning purposes under the restriction that the Protected Data be retained in confidence and not be further disclosed; or
(b) To DOE staff members or authorized DOE contractors or subcontractors performing work under the Government's program under the restriction that the Protected Data be retained in confidence and not be further disclosed.

(3) The obligations of confidentiality and restrictions on publication and dissemination shall end for any Protected Data:
(a) At the end of the protected period;
(b) If the data become publicly known or available from other sources without a breach of the obligation of confidentiality with respect to the Protected Data;
(c) If the same data are independently developed by someone who did not have access to the Protected Data and such data are made available without obligations of confidentiality; or
(d) If the Recipient disseminates or authorizes another to disseminate such data without obligations of confidentiality.

(4) However, the Recipient agrees that the following types of data are not considered to be protected and shall be provided to the Government when required by this award without any claim that the data are Protected Data: General test results and data that demonstrate progress toward meeting DOE's technical goals to design, construct, build, and operate a demonstration- or pilot-scale integrated biorefinery employing lignocellulosic or algal feedstocks, and in certain special cases starch feedstocks, for the production of (i) liquid transportation fuels, (ii) biobased chemicals, products or co-products, or (iii) substitutes for petroleum-based feedstocks and products. These results and data will be made available to the public and included in the final project report, and in other reports and presentations, as appropriate. The parties agree that notwithstanding the data enumerated above, nothing precludes the Government from seeking delivery of additional data in accordance with this award, or from making publicly available additional nonprotected data, nor does the preceding enumerated data constitute any admission by the Government that technical data not so enumerated are Protected Data. The general data described above shall not include the following types of data, which Recipient intends, without limitation, to claim and mark as Protected Data:

a) Process Flow Diagrams
b) Mass & Energy Balances
c) Process Performance Parameters and Costs by Unit Operation, including the quality of the data used for those performance parameters, (e.g., scale, replication, degree of integration, range of values, etc.)
d) Capital Cost Estimate and Basis thereof: e.g. factored, vendor quotes, actual purchase prices, etc.
e) Pro Forma with best reproducible results to date with all assumptions listed and the basis/rationale behind all pro forma input parameters explained, including but not necessarily limited to:
    i. Production cost parameters: e.g. consumables, utilities, labor, etc.
    ii. Water consumption requirements and costs
    iii. Waste disposal requirements and costs
f) Any additional financial and technical project information necessary and sufficient to validate the current and actual conversion costs associated with the facility or system as constructed and projected to be operated for converting lignocellulosic or algal feedstocks, and in certain special cases starch feedstocks, into (i) liquid

transportation fuels, or (ii) biobased chemicals, products or co-products, or (iii) substitutes for petroleum-based feedstocks and products.

g) Technical results based on data collected, to enable the analysis, assessment and evaluation of other areas of interest, including but not necessarily limited to life cycle assessments, green house gas emissions, and sustainability metrics.

(5) The Government's sole obligation with respect to any protected data shall be as set forth in this paragraph (g).

(h) Protection of Limited Rights Data
(1)When data other than that listed in subparagraphs (b)(1)(i), (ii), and (iii) of this clause are specified to be delivered under this agreement and such data qualify as either limited rights data or restricted computer software, the Recipient, if the Recipient desires to continue protection of such data, shall withhold such data and not furnish them to the Government under this agreement. As a condition to this withholding the Recipient shall identify the data being withheld and furnish form, fit, and function data in lieu thereof.

(2) Notwithstanding subparagraph (h)(1) of this clause, the agreement may identify and specify the delivery of limited rights data, or the Contracting Officer may require by written request the delivery of limited rights data that has been withheld or would otherwise be withholdable. If delivery of such data is so required, the Recipient may affix the following "Limited Rights Notice" to the data and the Government will thereafter treat the data, in accordance with such Notice:

LIMITED RIGHTS NOTICE
(a) These data are submitted with limited rights under Government Agreement No. DE-EE0002884. These data may be reproduced and used by the Government with the express limitation that they will not, without written permission of the Recipient, be used for purposes of manufacture nor disclosed outside the Government; except that the Government may disclose these data outside the Government for the following purposes, if any, provided that the Government makes such disclosure subject to prohibition against further use and disclosure:
(1) Use (except for manufacture) by Federal support services contractors within the scope of their contracts;
(2) These "limited rights data" may be disclosed for evaluation purposes under the restriction that the "limited rights data" be retained in confidence and not be further disclosed;
(3) These "limited rights data" may be disclosed to other contractors participating in the Government's program, of which this Recipient is a part, for information or use (except for manufacture) in connection with the work performed under their awards, and under the restriction that the "limited rights data" be retained in confidence and not be further disclosed;
(4) These "limited rights data" may be used by the Government or others on its behalf for emergency repair or overhaul work under the restriction that the "limited rights data" be retained in confidence and not be further disclosed; and
(5) Release to a foreign government, or instrumentality thereof, as the interests of the United States Government may require, for information or evaluation, or for emergency repair or overhaul work by such government.
(b) This Notice shall be marked on any reproduction of these data, in whole or in part.

(End of notice)

(i) Subaward/Contract

The Recipient has the responsibility to obtain from its subrecipients/contractors all data and rights therein necessary to fulfill the Recipient's obligations to the Government under this agreement. If a subrecipient/contractor refuses to accept terms affording the Government such rights, the Recipient shall promptly bring such refusal to the attention of the Contracting Officer and not proceed with subaward/contract award without further authorization.

(j) Additional Data Requirements

In addition to the data specified elsewhere in this agreement to be delivered, the Contracting Officer may, at anytime during agreement performance or within a period of 3 years after acceptance of all items to be delivered under this agreement, order any data first produced or specifically used in the performance of this agreement. This clause is applicable to all data ordered under this subparagraph. Nothing contained in this subparagraph shall require the Recipient to deliver any data the withholding of which is authorized by this clause or data which are specifically identified in this

agreement as not subject to this clause. When data are to be delivered under this subparagraph, the Recipient will be compensated for converting the data into the prescribed form, for reproduction, and for delivery.

(k) The Recipient agrees, except as may be otherwise specified in this agreement for specific data items listed as not subject to this paragraph, that the Contracting Officer or an authorized representative may, up to three years after acceptance of all items to be delivered under this contract, inspect at the Recipient's facility any data withheld pursuant to paragraph (h) of this clause, for purposes of verifying the Recipient's assertion pertaining to the limited rights or restricted rights status of the data or for evaluating work performance. Where the Recipient whose data are to be inspected demonstrates to the Contracting Officer that there would be a possible conflict of interest if the inspection were made by a particular representative, the Contracting Officer shall designate an alternate inspector.

(End of clause)

04. FAR 52.227-23 Rights to Proposal Data (Technical) (JUN 1987)

Except for the technical data contained in the Project Narrative, pages 1-15, the Project Management Plan pages 1-28, the Business and Commercialization plan pages 1-20, the Project Execution Plan pages 1-60, the Environmental Questionnaire pages 1-15, and the Intellectual Property Statement pages 1-5, it is agreed that as a condition of award of this contract, and notwithstanding the conditions of any notice appearing thereon, the Government shall have unlimited rights (as defined in the "Rights in Data--General" clause contained in this contract) in and to the technical data contained in the proposal upon which this contract is based.

05. FAR 52.227-12 Patent Rights - Waiver (JUL 1996), as modified by 10 C.F.R. 784, DOE Patent Waiver Regulations and U.S. Competitiveness clause

PATENT RIGHTS - WAIVER (JUL 1996)

(a) Definitions.
As used in this clause:

Background patent means a domestic patent covering an invention or discovery which is not a Subject Invention and which is owned or controlled by the Contractor at any time through the completion of this contract:

(i) Which the Contractor, but not the Government, has the right to license to others without obligation to pay royalties thereon, and

(ii) Infringement of which cannot reasonably be avoided upon the practice of any specific process, method, machine, manufacture or composition of matter (including relatively minor modifications thereof) which is a subject of the research, development, or demonstration work performed under this contract.

Contract means any contract, grant, agreement, understanding, or other arrangement, which includes research, development, or demonstration work, and includes any assignment or substitution of parties.

DOE patent waiver regulations means the Department of Energy patent waiver regulations at 10 CFR Part 784.

Invention as used in this clause, means any invention or discovery which is or may be patentable or otherwise protectable under Title 35 of the United States Code or any novel variety of plant that is or may be protectable under the Plant Variety Protection Act (7 U.S.C. 2321 et seq.).

Made when used in relation to any invention means the conception or first actual reduction to practice of such invention.

Nonprofit organization means a university or other institution of higher education or an organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 U.S.C. 501(c)) and exempt from taxation under section 501(a) of the Internal Revenue Code (26 U.S.C. 501(a)) or any nonprofit scientific or educational organization qualified under a state nonprofit organization statute.

Patent Counsel means the Department of Energy Patent Counsel assisting the procuring activity.

Practical application means to manufacture, in the case of a composition or product; to practice, in the case of a process or method; or to operate, in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public on reasonable terms.

Secretary means the Secretary of Energy.

Small business firm means a small business concern as defined at Section 2 of the Pub. L. 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of this clause, the size standards for small business concerns involved in Government procurement and subcontracting at 13 CFR 121.3-8 and 13 CFR 121.3-12, respectively, will be used.

Subject invention means any invention of the Contractor conceived or first actually reduced to practice in the course of or under this contract, provided that in the case of a variety of plant, the date of determination (as defined in section 41(d) of the Plant Variety Protection Act (7 U.S.C. 2401(d)) must also occur during the period of contract performance.

(b) Allocation of principal rights.
Whereas DOE has granted a waiver of rights to subject inventions to the Contractor, the Contractor may elect to retain the entire right, title, and interest throughout the world to each subject invention subject to the provisions of this clause and 35 U.S.C. "202 and 203. With respect to any subject invention in which the Contractor elects to retain title, the Federal Government shall have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention throughout the world.

(c) Invention disclosure, election of title, and filing of patent applications by Contractor.

(1) The Contractor shall disclose each subject invention to the Patent Counsel within six months after conception or first actual reduction to practice, whichever occurs first in the course of or under this contract, but in any event, prior to any sale, public use, or public disclosure of such invention known to the Contractor. The disclosure to the Patent Counsel shall be in the form of a written report and shall identify the inventors and the contract under which the invention was made. It shall be sufficiently complete in technical detail to convey a clear understanding, to the extent known at the time of the disclosure, of the nature, purpose, operation, and physical, chemical, biological, or electrical characteristics of the invention. The disclosure shall also identify any publication, on sale, or public use of the invention and whether a manuscript describing the invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to the Patent Counsel, the Contractor shall promptly notify the Patent Counsel of the acceptance of any manuscript describing the invention for publication or of any on sale or public use planned by the Contractor.

(2) The Contractor shall elect in writing whether or not to retain title to any such invention by notifying the Patent Counsel at the time of disclosure or within 8 months of disclosure, as to those countries (including the United States) in which the Contractor will retain title; provided, that in any case where publication, on sale, or public use has initiated the 1-year statutory period wherein valid patent protection can still be obtained in the United States, the period of election of title may be shortened by the Agency to a date that is no more than 60 days prior to the end of the statutory period. The Contractor shall notify the Patent Counsel as to those countries (including the United States) in which the Contractor will retain title not later than 60 days prior to the end of the statutory period.

(3) The Contractor shall file its United States patent application on an elected invention within 1 year after election, but not later than at least 60 days prior to the end of any statutory period wherein valid patent protection can be obtained in the United States after a publication, on sale, or public use. The Contractor shall file patent applications in additional countries (including the European Patent Office and under the Patent Cooperation Treaty) within either 10 months of the corresponding initial patent application or 6 months from the date permission is granted by the Commissioner of Patents and Trademarks to file foreign patent applications where foreign filing has been prohibited by a Secrecy Order.

(4) Requests for extension of the time for disclosure to the Patent Counsel, election, and filing may, at the discretion of DOE, be granted, and will normally be granted unless the Patent Counsel has reason to believe that a particular extension would prejudice the Government's interest.

(d) Conditions when the Government may obtain title notwithstanding an existing waiver. The Contractor shall convey to DOE, upon written request, title to any subject invention--

(1) If the Contractor elects not to retain title to a subject invention;

(2) If the Contractor fails to disclose or elect the subject invention within the times specified in paragraph (c) of this clause (provided that DOE may only request title within 60 days after learning of the Contractor's failure to report or elect within the specified times);

(3) In those countries in which the Contractor fails to file patent applications within the times specified in paragraph (c) of this clause; provided, however, that if the Contractor has filed a patent application in a country after the times specified in paragraph (c) of this clause, but prior to its receipt of the written request of DOE, the Contractor shall continue to retain title in that country;

(4) In any country in which the Contractor decides not to continue the prosecution of any application for, to pay the maintenance fees on, or defend in reexamination or opposition proceeding on, a patent on a subject invention; or

(5) If the waiver authorizing the use of this clause is terminated as provided in paragraph (p) of this clause.

(e) Minimum rights to Contractor when the Government retains title.

(1) The Contractor shall retain a nonexclusive, royalty-free license throughout the world in each subject invention to which the Government obtains title under paragraph (d) of this clause except if the Contractor fails to disclose the subject invention within the times specified in paragraph (c) of this clause. The Contractor's license extends to its domestic subsidiaries and affiliates, if any, within the corporate structure of which the Contractor is a part and includes the right to grant sublicenses of the same scope to the extent the Contractor was legally obligated to do so at the time the contract was awarded. The license is transferable only with the approval of DOE except when transferred to the successor of that part of the Contractor's business to which the invention pertains.

(2) The Contractor's domestic license may be revoked or modified by DOE to the extent necessary to achieve expeditious practical application of the subject invention pursuant to an application for an exclusive license submitted in accordance with applicable provisions in 37 CFR part 404 and DOE licensing regulations. This license shall not be revoked in that field of use or the geographical areas in which the Contractor has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of DOE to the extent the Contractor, its licensees, or its domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, DOE shall furnish the Contractor a written notice of its intention to revoke or modify the license, and the Contractor shall be allowed 30 days (or such other time as may be authorized by DOE for good cause shown by the Contractor) after the notice to show cause why the license should not be revoked or modified. The Contractor has the right to appeal, in accordance with applicable agency licensing regulations and 37 CFR part 404 concerning the licensing of Government-owned inventions, any decision concerning the revocation or modification of its license.

(f) Contractor action to protect the Government's interest.

(1) The Contractor agrees to execute or to have executed and promptly deliver to DOE all instruments necessary to:

(i) establish or confirm the rights the Government has throughout the world in those subject inventions to which the Contractor elects to retain title, and

(ii) convey title to DOE when requested under paragraphs (d) and (n) (2) of this clause, and to enable the Government to obtain patent protection throughout the world in that subject invention.

(2) The Contractor agrees to require, by written agreement, its employees, other than clerical and nontechnical employees, to disclose promptly in writing to personnel identified as responsible for the administration of patent matters and in a format suggested by the Contractor each subject invention made under contract in order that the Contractor can

comply with the disclosure provisions of paragraph (c) of this clause, and to execute all papers necessary to file patent applications on subject inventions and to establish the Government's rights in the subject inventions. This disclosure format should require, as a minimum, the information required by paragraph (c)(1) of this clause. The Contractor shall instruct such employees through employee agreements or other suitable educational programs on the importance of reporting inventions in sufficient time to permit the filing of patent applications prior to U.S. or foreign statutory bars.

(3) The Contractor shall notify DOE of any decision not to continue the prosecution of a patent application, pay maintenance fees, or defend in a reexamination or opposition proceeding on a patent, in any country, not less than 30 days before the expiration of the response period required by the relevant patent office.

(4) The Contractor agrees to include, within the specification of any United States patent application and any patent issuing thereon covering a subject invention, the following statement: "This invention was made with Government support under (identify the contract) awarded by DOE. The Government has certain rights in this invention."

(5) The Contractor shall establish and maintain active and effective procedures to assure that subject inventions are promptly identified and disclosed to Contractor personnel responsible for patent matters within 6 months of conception and/or first actual reduction to practice, whichever occurs first in the course of or under this contract. These procedures shall include the maintenance of laboratory notebooks or equivalent records and other records as are reasonably necessary to document the conception and/or the first actual reduction to practice of subject inventions, and records that show that the procedures for identifying and disclosing the inventions are followed. Upon request, the Contractor shall furnish the Patent Counsel a description of such procedures for evaluation and for determination as to their effectiveness.

(6) The Contractor agrees, when licensing a subject invention, to arrange to avoid royalty charges on acquisitions involving Government funds, including funds derived through Military Assistance Program of the Government or otherwise derived through the Government; to refund any amounts received as royalty charges on the subject invention in acquisitions for, or on behalf of, the Government; and to provide for such refund in any instrument transferring rights in the invention to any party.

(7) The Contractor shall furnish the Patent Counsel the following:

(i) Interim reports every 12 months (or such longer period as may be specified by the Patent Counsel) from the date of the contract, listing subject inventions during that period and certifying that all subject inventions have been disclosed or that there are no such inventions.

(ii) A final report, within 3 months after completion of the contracted work, listing all subject inventions or certifying that there were no such inventions, and listing all subcontracts at any tier containing a patent rights clause or certifying that there were no such subcontracts.

(8) The Contractor shall promptly notify the Patent Counsel in writing upon the award of any subcontract at any tier containing a patent rights clause by identifying the subcontractor, the applicable patent rights clause, the work to be performed under the subcontract, and the dates of award and estimated completion. Upon request of the Patent Counsel, the Contractor shall furnish a copy of such subcontract, and no more frequently than annually, a listing of the subcontracts that have been awarded.

(9) The Contractor shall provide, upon request, the filing date, serial number and title, a copy of the patent application (including an English-language version if filed in a language other than English), and patent number and issue date for any subject invention for which the Contractor has retained title.

(10) Upon request, the Contractor shall furnish the Government an irrevocable power to inspect and make copies of the patent application file.

(g) Subcontracts.

(1) Unless otherwise directed by the Contracting Officer, the Contractor shall include the clause at 48 CFR 952.227-11, suitably modified to identify the parties, in all subcontracts, regardless of tier, for experimental, developmental, or research work to be performed by a small business firm or nonprofit organization, except where the

work of the subcontract is subject to an Exceptional Circumstances Determination by DOE. In all other subcontracts, regardless of tier, for experimental, developmental, demonstration, or research work, the Contractor shall include the patent rights clause at 48 CFR 952.227-13 (suitably modified to identify the parties).

(2) The Contractor shall not, as part of the consideration for awarding the subcontract, obtain rights in the subcontractor's subject inventions.

(3) In the case of subcontractors at any tier, the Department, the subcontractor, and Contractor agree that the mutual obligations of the parties created by this clause constitute a contract between the subcontractor and the Department with respect to those matters covered by this clause.

(4) The Contractor shall promptly notify the Contracting Officer in writing upon the award of any subcontract at any tier containing a patent rights clause by identifying the subcontractor, the applicable patent rights clause, the work to be performed under the subcontract, and the dates of award and estimated completion. Upon request of the Contracting Officer, the Contracting Officer shall furnish a copy of such subcontract, and, no more frequently than annually, a listing of the subcontracts that have been awarded.

(h) Reporting on utilization of subject inventions.

The Contractor agrees to submit on request periodic reports no more frequently than annually on the utilization of a subject invention or on efforts at obtaining such utilization that are being made by the Contractor and any of its licensees or assignees. Such reports shall include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Contractor, and such other data and information as DOE may reasonably specify. The Contractor also agrees to provide additional reports as may be requested by DOE in connection with any march-in proceedings undertaken by DOE in accordance with paragraph (j) of this clause. To the extent data or information supplied under this paragraph is considered by the Contractor, its licensee or assignee to be privileged and confidential and is so marked, DOE agrees that, to the extent permitted by law, it shall not disclose such information to persons outside the Government.

(i) Preference for United States industry.

Notwithstanding any other provision of this clause, the Contractor agrees that neither it nor any assignee will grant to any person the exclusive right to use or sell any subject invention in the United States unless such person agrees that any products embodying the subject invention will be manufactured substantially in the United States. However, in individual cases, the requirement for such an agreement may be waived by DOE upon a showing by the Contractor or its assignee that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible.

(j) March-in rights.

The Contractor agrees that with respect to any subject invention in which it has acquired title, DOE has the right in accordance with the procedures in 48 CFR 27.304-1(g) to require the Contractor, an assignee, or exclusive licensee of a subject invention to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if the Contractor, assignee, or exclusive licensee refuses such a request, DOE has the right to grant such a license itself if DOE determines that--

(1) Such action is necessary because the Contractor or assignee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of the subject invention in such field of use;

(2) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the Contractor, assignee, or their licensees;
(3) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by the Contractor, assignee, or licensees; or

(4) Such action is necessary because the agreement required by paragraph (i) of this clause has not been obtained or waived or because a licensee of the exclusive right to use or sell any subject invention in the United States is in breach of such agreement.

(k) Background Patents [reserved]

(l) Communications.
All reports and notifications required by this clause shall be submitted to the Patent Counsel unless otherwise instructed.

(m) Other inventions.
Nothing contained in this clause shall be deemed to grant to the Government any rights with respect to any invention other than a subject invention, except with respect to Background Patents, above.

(n) Examination of records relating to inventions.

(1) The Contracting Officer or any authorized representative shall, until 3 years after final payment under this contract, have the right to examine any books (including laboratory notebooks), records, and documents of the Contractor relating to the conception or first actual reduction to practice of inventions in the same field of technology as the work under this contract to determine whether--

(i) Any such inventions are subject inventions;

(ii) The Contractor has established and maintains the procedures required by paragraphs (f)(2) and (f)(5) of this clause; and

(iii) The Contractor and its inventor have complied with the procedures.

(2) If the Contracting Officer determines that an inventor has not disclosed a subject invention to the Contractor in accordance with the procedures required by paragraph (f)(5) of this clause, the Contracting Officer may, within 60 days after the determination, request title in accordance with paragraphs (d)(2) and (d)(3) of this clause. However, if the Contractor establishes that the failure to disclose did not result from the Contractor's fault or negligence, the Contracting Officer shall not request title.

(3) If the Contracting Officer learns of an unreported Contractor invention which the Contracting Officer believes may be a subject invention, the Contractor may be required to disclose the invention to DOE for a determination of ownership rights.

(4) Any examination of records under this paragraph shall be conducted in such a manner as to protect the confidentiality of the information involved.

(o) Withholding of payment.
NOTE: This paragraph does not apply to subcontracts or grants.

(1) Any time before final payment under this contract, the Contracting Officer may, in the Government's interest, withhold payment until a reserve not exceeding $50,000 or 5 percent of the amount of the contract, whichever is less, shall have been set aside if, in the Contracting Officer's opinion, the Contractor fails to--

(i) Establish, maintain, and follow effective procedures for identifying and disclosing subject inventions pursuant to paragraph (f)(5) of this clause;
(ii) Disclose any subject invention pursuant to paragraph (c)(1) of this clause;
(iii) Deliver acceptable interim reports pursuant to paragraph (f)(7)(I) of this clause;
(iv) Provide the information regarding subcontracts pursuant to paragraph (f) (6) of this clause; or
(v) Convey to the Government, using a DOE-approved form, the title and/or rights of the Government in each subject invention as required by this clause.

(2) Such reserve or balance shall be withheld until the Contracting Officer has determined that the Contractor has rectified whatever deficiencies exist and has delivered all reports, disclosures, and other information required by this clause.

(3) Final payment under this contract shall not be made before the Contractor delivers to the Patent Counsel all disclosures of subject inventions required by paragraph (c)(1) of this clause, an acceptable final report pursuant to paragraph (f)(7)(ii) of this clause, and all past due confirmatory instruments, and the Patent Counsel has issued a patent clearance certification to the Contracting Officer.

(4) The Contracting Officer may decrease or increase the sums withheld up to the maximum authorized above. If the maximum amount authorized above is already being withheld under other provisions of the contract, no additional amount shall be withheld under this paragraph. The withholding of any amount or the subsequent payment thereof shall not be construed as a waiver of any Government right.

(p) Waiver Terminations.

Any waiver granted to the Contractor authorizing the use of this clause (including any retention of rights pursuant thereto by the Contractor under paragraph (b) of this clause) may be terminated at the discretion of the Secretary or his designee in whole or in part, if the request for waiver by the Contractor is found to contain false material statements or nondisclosure of material facts, and such were specifically relied upon by DOE in reaching the waiver determination. Prior to any such termination, the Contractor will be given written notice stating the extent of such proposed termination and the reasons therefore, and a period of 30 days, or such longer period as the Secretary or his designee shall determine for good cause shown in writing, to show cause why the waiver of rights should not be so terminated. Any waiver termination shall be subject to the Contractor's minimum license as provided in paragraph (e) of this clause.

(q) Atomic Energy.

No claim for pecuniary award or compensation under the provisions of the Atomic Energy Act of 1954, as amended, shall be asserted by the Contractor or its employees with respect to any invention or discovery made or conceived in the course of or under this contract.

(r) Publication.

It is recognized that during the course of work under this contract, the contractor or its employees may from time to time desire to release or publish information regarding scientific or technical developments conceived or first actually reduced to practice in the course of or under this contract. In order that public disclosure of such information will not adversely affect the patent interests of DOE or the contractor, approval for release of publication shall be secured from Patent Counsel prior to any such release or publication. In appropriate circumstances, and after consultation with the contractor, Patent Counsel may waive the right of prepublication review.

(s) Forfeiture of rights in unreported subject inventions.

(1) The contractor shall forfeit and assign to the Government, at the request of the Secretary of Energy or designee, all rights in any subject invention which the contractor fails to report to Patent Counsel within six months after the time the contractor:

(i) Files or causes to be filed a United States or foreign patent application thereon; or

(ii) Submits the final report required by paragraph (f)(7)(ii) of this clause, whichever is later.

(2) However, the Contractor shall not forfeit rights in a subject invention if, within the time specified in paragraph (n)(1) of this clause, the contractor:

(i) Prepares a written decision based upon a review of the record that the invention was neither conceived nor first actually reduced to practice in the course of or under the contract and delivers the decision to Patent Counsel, with a copy to the Contracting Officer; or

(ii) Contending that the subject invention is not a subject invention, the contractor nevertheless discloses the subject invention and all facts pertinent to this contention to the Patent Counsel, with a copy to the Contracting Officer, or

(iii) Establishes that the failure to disclose did not result from the contractor's fault or negligence.

(3) Pending written assignment of the patent application and patents on a subject invention determined by the Contracting Officer to be forfeited (such determination to be a Final Decision under the Disputes clause of this contract), the contractor shall be deemed to hold the invention and the patent applications and patents pertaining thereto in trust for the Government. The forfeiture provision of this paragraph shall be in addition to and shall not supersede any other rights and remedies which the Government may have with respect to subject inventions.

(t) U.S. Competitiveness

The Contractor agrees that any products embodying any waived invention or produced through the use of any waived invention will be manufactured substantially in the United States unless the Contractor can show to the satisfaction of the DOE that it is not commercially feasible to do so. In the event the DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, *e.g.*, recoupment of the Government's investment, etc. The Contractor agrees that it will not license, assign or otherwise transfer any waived invention to any entity unless that entity agrees to these same requirements. Should the Contractor or other such entity receiving rights in the invention undergo a change in ownership amounting to a controlling interest, then the waiver, assignment, license, or other transfer of rights in the waived invention is suspended until approved in writing by the DOE.

(End of clause)

STATEMENT OF PROJECT OBJECTIVES

Sapphire Energy, Inc.
Recovery Act – Sapphire Integrated Algal Biorefinery (IABR)

A. PROJECT OBJECTIVES

The Sapphire Integrated Algal Biorefinery (IABR) project will realize the following objectives:

1. The design and construction of: all required infrastructure, including equipment, design and control methods, for the production of algal oil for green jet fuel and green diesel.

2. The shakedown and testing of: material and energy flows for all processes inputs and product flows and comparison of different process operating conditions, product flow rates and yields from different commercial algal strains against model projections.

3. The establishment of: steady state operations including material and energy balances; plant process design, including operating conditions, cash flow and capital requirements for a full-scale commercial plant capable of producing greater than 150 million gallons of algae oil per year (10,000 bpd).

B. PROJECT SCOPE

The IABR will be built in Luna Country, near Columbus, New Mexico. The algae will fix approximately 56 metric tons of CO_2 per day and produce, on average, 100 barrels of green crude oil per day, or approximately 1 million gallons per year of finished fuel product. The successful project will demonstrate the technical and economic feasibility of the algae to green fuels process that will form the basis for a series of commercial scale biorefineries.

C. TASKS TO BE PERFORMED

Budget Period 1:

A Phase 0 – Origination

A.1 DOE Project Periods
Project budget Periods defined.

A.2 DOE Core Work Breakdown Structure (WBS) Elements
DOE Core WBS Elements included in WBS structure for project tracking purposes.

A.3 Feasibility Study
Overall project concept feasibility study.

A.4 Phase 0 Stage Gate Evaluation GN - Go/No Go Decision

A.4.ML.1 Phase 0 Stage Gate Complete
Complete project Stage Gate evaluation.

B **Phase 1 – Conceptual Analysis**

B.1 Process Development (Front End Loading (FEL) – 1)
Project scope definition, initial process diagrams, capital cost estimation, equipment list and layout, Class 40 Estimation level. Project siting studies, permitting investigation, long lead permit activity and site due-diligence work. Identification of potential project site(s).

Redacted Exemption 4

B.1.ML.1 FEL-1 Complete E – Project Internal Tracking
FEL-1 Engineering work complete; internal tracking milestone. Indicates completion of B.1 subtask.

B.2 Phase 1 Stage Gate Evaluation

B.2.GN.1 **Phase 1 Stage Gate Evaluation** GN - Go/No Go Decision
Project Stage Gate Evaluation.

C **Phase 2 – Process Design**

C.1 Process Definition (FEL-2)
Engineering, planning and estimation work to refine process diagrams, energy balances, capital and operating expense estimates, equipment list and site general arrangement. Estimation to Class 25 Level.

Redacted Exemption 4

C.1.ML.1 FEL-2 Complete E – Project Internal Tracking
Front End Loaded-2 engineering work complete; internal tracking milestone. Indicates completion of C.1 subtasks.

C.1.ML.2 30% Design Complete E – Project Internal Tracking
Milestone indicating project design has reached 30% design level. Information and design basis supplied to permitting activities to proceed with final permitting activities.

C.2 Site Planning
Finalization of project site selection.
Completion of required site due-diligence efforts.
Completion of regulatory and permitting requirements review and scope.

C.2.ML.1 Land Purchase Option Executed E – Project Internal Tracking
Project site real property secure.

C.3 Phase 2 Stage Gate Evaluation

C.3.GN.1 Phase 2 Stage Gate Evaluation GN - Go/No Go Decision
Project Stage Gate evaluation.

D Phase 3 - Front End Engineering Design (FEL-3)

D.1 Front End Engineering Design FEL-3
Front End Engineering work to FEL-3 level deliverables.

D.1.ML.1 FEL-3 Complete E – Project Internal Tracking
Front End Loaded-3 engineering work complete; internal tracking milestone. Indicates completion of C.1 subtasks.

D.2 Permitting
Completion of all required permitting activities for project construction and operation.

D.2.ML.1 Receipt of 30% Design E – Project Internal Tracking
Thirty percent design received from FEL engineering activities; allowing permitting to proceed to completion.

D.2.ML.2 Permitting Complete E – Project Internal Tracking
All project permits secured.

D.3 NEPA
Formal NEPA review.

D.3.ML.1 NEPA Finding Issued E – Project Internal Tracking
NEPA process complete and agency NEPA determination issued.

D.4 Phase 3 Gate Evaluation

D.4.GN.1 Phase 3 Stage Gate Evaluation — GN – Go/No Go Decision
Project Stage Gate evaluation.

E Research and Development

E.1 Pond Liner Research
Technology development to advance pond liner design and economics.

E.2 Pond Modeling
Technology development to reduce pond construction and operation costs.

F Project Management and Reporting
Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting Checklist following the instructions included therein

Budget Period 2 (and any other potential budget periods): TBD

Details of Budget Period 2 tasks consisting of, and not limited to, final engineering design, construction, shakedown, and operation will be determined prior to the conclusion of Budget Period 1.

DOE F 4600.2
(02/09)
All Other Editions Are Obsolete

U.S. Department of Energy
FEDERAL ASSISTANCE REPORTING CHECKLIST AND INSTRUCTIONS

1. Identification Number: DE -EE0002884.002	2. Program/Project Title: Recovery Act - Sapphire Integrated Algal Biofinery (IABR)
3. Recipient: Sapphire Energy, Inc.	

4. Reporting Requirements:		Frequency	No. of Copies	Address
A. MANAGEMENT REPORTING				
☑ Progress Report		A		https://www.eere-pmc.energy.gov/SubmitReports.aspx
☑ Special Status Report (see special instructions)		A		
B. SCIENTIFIC/TECHNICAL REPORTING (Reports/Products must be submitted with appropriate DOE F 241. The forms are available at www.osti.gov/elink)				
Report/Product	Form			
☑ Final Scientific Report	DOE F 241.3	F		http://www.osti.gov/elink-2413
☑ Conference papers/proceedings*	DOE F 241.3	A		http://www.osti.gov/elink-2413
☑ Software/Manual	DOE F 241.4	A		http://www.osti.gov/estsc/241-4pre.jsp
☐ Other (see special instructions)	DOE F 241.3			
** Scientific and technical conferences only*				
C.FINANCIAL REPORTING				
☑ SF-425, Federal Financial Report		FQ		https://www.eere-pmc.energy.gov/SubmitReports.aspx
D. CLOSEOUT REPORTING				
☑ Patent Certification		F		https://www.eere-pmc.energy.gov/SubmitReports.aspx
☑ Property Certification		F		
☐ Other (see Special Instructions)				
E. OTHER REPORTING				
☑ Annual Indirect Cost Proposal		F Y		
☑ Annual Inventory of Federally Owned Property, If Any		F Y		
☑ Other (see special instructions)		A F Q		

FREQUENCY CODES AND DUE DATES:

A - Within 5 calendar days after events or as specified.

F - Final; 90 calendar days after expiration or termination of the award.

Y - Yearly; 90 days after the end of the reporting period.

S - Semiannually; within 30 days after end of the reporting period.

Q - Quarterly; within 30 days after end of the reporting period.

5. Special Instructions: The forms identified in the checklist are available at http://management.energy.gov/business_doe/business_forms.htm.

MANAGEMENT REPORTING
Special Instructions for the Progress Report: 1) The monthly progress report and financial spreadsheet templates will be forwarded to the Recipient after award. These reports are due within 30 days following the end of each month the project is active.

OTHER REPORTING
Special Instructions: 1) A Project Management Plan (PMP) is due to the Project Officer 30 days after award and should be revised on a yearly basis. An electronic template will be provided to the Recipient to complete or update as needed. 2) An Annual Technical and Financial Report must be developed and submitted to the DOE Project Officer after award and must be updated annually throughout the duration of the award. Subject to the availability of project funding, the Report will also be due annually for three (3) years after the facility is substantially completed. The schedule for submission will be established by the DOE Project Officer after award. The format of the report with instructions for completion, the electronic template for reporting data, and the schedule will be forwarded to the Recipient after award. 3) Comprehensive Annual Project Review - The Recipient will be required to present the Annual Technical and Financial Report at a Comprehensive Annual Project Review Meeting. The schedule for the Comprehensive Annual Project Review will be established by the DOE Project Officer after the award. AMERICAN RECOVERY AND REINVESTMENT ACT REPORTING: See the Special Terms and Conditions for Recovery Act reporting requirements, along with the following website: http:/www.federalreporting.gov. The required reports are due no later than ten calendar days after each calendar quarter in which the recipient receives the assistance award funded in whole or in part by the Recovery Act. Recipeints are to report according to ARRA reporting instructions.

A. MANAGEMENT REPORTING

Progress Report

The Progress Report must provide a concise narrative assessment of the status of work and include the following information and any other information identified under Special Instructions on the Federal Assistance Reporting Checklist:

1. The DOE award number and name of the recipient.

2. The project title and name of the project director/principal investigator.

3. Date of report and period covered by the report.

4. A comparison of the actual accomplishments with the goals and objectives established for the period and reasons why the established goals were not met.

5. A discussion of what was accomplished under these goals during this reporting period, including major activities, significant results, major findings or conclusions, key outcomes or other achievements. **This section should not contain any proprietary data or other information not subject to public release.** If such information is important to reporting progress, do not include the information, but include a note in the report advising the reader to contact the Principal Investigator or the Project Director for further information.

6. Cost Status. Show approved budget by budget period and actual costs incurred. If cost sharing is required break out by DOE share, recipient share, and total costs.

7. Schedule Status. List milestones, anticipated completion dates and actual completion dates. If you submitted a project management plan with your application, you must use this plan to report schedule and budget variance. You may use your own project management system to provide this information.

8. Any changes in approach or aims and reasons for change. Remember significant changes to the objectives and scope require prior approval by the contracting officer.

9. Actual or anticipated problems or delays and actions taken or planned to resolve them.

10. Any absence or changes of key personnel or changes in consortium/teaming arrangement.

11. A description of any product produced or technology transfer activities accomplished during this reporting period, such as:

    A. Publications (list journal name, volume, issue); conference papers; or other public releases of results.

    B. Web site or other Internet sites that reflect the results of this project.

    C. Networks or collaborations fostered.

D. Technologies/Techniques.

E. Inventions/Patent Applications.

F. Other products, such as data or databases, physical collections, audio or video, software or netware, models, educational aid or curricula, instruments or equipment.

Special Status Report

The recipient must report the following events as soon as possible after they occur:

1. Developments that have a significant favorable impact on the project.

2. Problems, delays, or adverse conditions which materially impair the recipient's ability to meet the objectives of the award or which may require DOE to respond to questions relating to such events from the public. The recipient must report any of the following incidents and include the anticipated impact and remedial action to be taken to correct or resolve the problem/condition:

   a. Any single fatality or injuries requiring hospitalization of five or more individuals.

   b. Any significant environmental permit violation.

   c. Any verbal or written Notice of Violation of any Environmental, Safety, and Health statutes or regulations.

   d. Any incident which causes a significant process or hazard control system failure.

   e. Any event which is anticipated to cause a significant schedule slippage or cost increase.

   f. Any damage to Government-owned equipment valued in excess of $50,000.

   g. Any other incident that has the potential for high visibility in the media.

B. SCIENTIFIC/TECHNICAL REPORTS

Final Scientific/Technical Report

Content. The final scientific/technical report must include the following information and any other information identified under Special Instructions on the Federal Assistance Reporting Checklist:

1. Identify the DOE award number; name of recipient; project title; name of project director/principal investigator; and consortium/teaming members.

2. Display prominently on the cover of the report any authorized distribution limitation notices, such as patentable material or protected data. Reports delivered without such notices may

be deemed to have been furnished with unlimited rights, and the Government assumes no liability for the disclosure, use or reproduction of such reports.

3. Provide an executive summary, which includes a discussion of 1) how the research adds to the understanding of the area investigated; 2) the technical effectiveness and economic feasibility of the methods or techniques investigated or demonstrated; or 3) how the project is otherwise of benefit to the public. The discussion should be a minimum of one paragraph and written in terms understandable by an educated layman.

4. Provide a comparison of the actual accomplishments with the goals and objectives of the project

5. Summarize project activities for the entire period of funding, including original hypotheses, approaches used, problems encountered and departure from planned methodology, and an assessment of their impact on the project results. Include, if applicable, facts, figures, analyses, and assumptions used during the life of the project to support the conclusions.

6. Identify products developed under the award and technology transfer activities, such as:

    a. Publications (list journal name, volume, issue), conference papers, or other public releases of results.

    b. Web site or other Internet sites that reflect the results of this project;

    c. Networks or collaborations fostered;

    d. Technologies/Techniques;

    e. Inventions/Patent Applications, licensing agreements; and

    f. Other products, such as data or databases, physical collections, audio or video, software or netware, models, educational aid or curricula, instruments or equipment.

7. For projects involving computer modeling, provide the following information with the final report:

    a. Model description, key assumptions, version, source and intended use;

    b. Performance criteria for the model related to the intended use;

    c. Test results to demonstrate the model performance criteria were met (e.g., code verification/validation, sensitivity analyses, history matching with lab or field data, as appropriate);

    d. Theory behind the model, expressed in non-mathematical terms;

    e. Mathematics to be used, including formulas and calculation methods;

    f. Whether or not the theory and mathematical algorithms were peer reviewed, and, if so, include a summary of theoretical strengths and weaknesses;

g. Hardware requirements; and

h. Documentation (e.g., users guide, model code).

Electronic Submission. The final scientific/technical report must be submitted electronically via the DOE Energy Link System (E-Link) at http://www.osti.gov/elink-2413.

Electronic Format. Reports must be submitted in the ADOBE PORTABLE DOCUMENT FORMAT (PDF) and be one integrated PDF file that contains all text, tables, diagrams, photographs, schematic, graphs, and charts.

Submittal Form. The report must be accompanied by a completed electronic version of DOE Form 241.3, "U.S. Department of Energy (DOE), Announcement of Scientific and Technical Information (STI)." You can complete, upload, and submit the DOE F.241.3 online via E-Link. You are encouraged not to submit patentable material or protected data in these reports, but if there is such material or data in the report, you must: (1) clearly identify patentable or protected data on each page of the report; (2) identify such material on the cover of the report; and (3) mark the appropriate block in Section K of the DOE F 241.3. Reports must not contain any limited rights data (proprietary data), classified information, information subject to export control classification, or other information not subject to release. Protected data is specific technical data, first produced in the performance of the award that is protected from public release for a period of time by the terms of the award agreement.

Protected Personally Identifiable Information (PII). Management Reports or Scientific/Technical Reports must not contain any Protected PII. PII is any information about an individual which can be used to distinguish or trace an individual's identity. Some information that is considered to be PII is available in public sources such as telephone books, public websites, university listings, etc. This type of information is considered to be Public PII and includes, for example, first and last name, address, work telephone number, e-mail address, home telephone number, and general educational credentials. In contrast, Protected PII is defined as an individual's first name or first initial and last name in combination with any one or more of types of information, including, but not limited to, social security number, passport number, credit card numbers, clearances, bank numbers, biometrics, date and place of birth, mother's maiden name, criminal, medical and financial records, educational transcripts, etc.

Conference Papers/Proceedings

Content. The recipient must submit a copy of any conference papers/proceedings, with the following information: (1) Name of conference; (2) Location of conference; (3) Date of conference; and (4) Conference sponsor.

Electronic Submission. Scientific/technical conference paper/proceedings must be submitted electronically via the DOE Energy Link System (E-Link) at http://www.osti.gov/elink-2413. Non-scientific/technical conference papers/proceedings must be sent to the URL listed on the Reporting Checklist.

Electronic Format. Conference papers/proceedings must be submitted in the ADOBE PORTABLE DOCUMENT FORMAT (PDF) and be one integrated PDF file that contains all text, tables, diagrams, photographs, schematic, graphs, and charts.

Submittal Form. Scientific/technical conference papers/proceedings must be accompanied by a completed DOE Form 241.3. The form and instructions are available on E-Link at http://www.osti.gov/elink-2413. This form is not required for non-scientific or non-technical conference papers or proceedings.

Software/Manual

Content. Unless otherwise specified in the award, the following must be delivered: source code, the executable object code and the minimum support documentation needed by a competent user to understand and use the software and to be able to modify the software in subsequent development efforts.

Electronic Submission. Submissions may be submitted electronically via the DOE Energy Link System (E-Link) at http://www.osti.gov/estsc/241-4pre.jsp They may also be submitted via regular mail to:

Energy Science and Technology Software Center
P.O. Box 1020
Oak Ridge, TN 37831

Submittal Form. Each software deliverable and its manual must be accompanied by a completed DOE Form 241.4 "Announcement of U.S. Department of Energy Computer Software." The form and instructions are available on E-Link at http://www.osti.gov/estsc//241-4pre.jsp.

C. FINANCIAL REPORTING

Recipients must complete the SF-425 as identified on the Reporting Checklist in accordance with the report instructions. A fillable version of the form is available at http://www.whitehouse.gov/omb/grants/grants_forms.aspx.

D. CLOSEOUT REPORTS

Final Invention and Patent Report

The recipient must provide a DOE Form 2050.11 , "PATENT CERTIFICATION." This form is available at http://www.directives.doe.gov/pdfs/forms/2050-11.pdf and http://management.energy.gov/business_doe/business_forms.htm.

Property Certification

The recipient must provide the Property Certification, including the required inventories of non-exempt property, located at http://management.energy.gov/business_doe/business_forms.htm.

E. OTHER REPORTING

Annual Indirect Cost Proposal and Reconciliation

Requirement. In accordance with the applicable cost principles, the recipient must submit an annual indirect cost proposal, reconciled to its financial statements, within six months after the close of the fiscal year, unless the award is based on a predetermined or fixed indirect rate (s), or a fixed amount for indirect facilities and administration (F&A) costs.

Cognizant Agency. The recipient must submit its annual indirect cost proposal directly to the cognizant agency for negotiating and approving indirect costs.

Annual Inventory of Federally Owned Property

Requirement. If at any time during the award the recipient is provided with Government-furnished property or aquires property with project funds and the award specifies that the property vests in the Federal Government (i.e. federally owned property), the recipient must submit an annual inventory of this property to the DOE Award Administrator identified in Block 12 of the Notice of Financial Assistance Award no later then October 30th of each calendar year, to cover an annual reporting period ending on the preceding September 30th.

Content of Inventory. The inventory must include a description of property, tag number, acquisition date, location of property, and acquisition cost, if purchased with project funds. The report must list all federally owned property, including property located at subcontractor's facilities or other locations.

Applicant Name: Sapphire Energy - BP1, FY2010 Award Number: DE-EE0002884.002 Attachment 4

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. Budget Period 1	81.087			$6,503,098	Redacted Exemption 4	
2. Budget Period 2	81.087			TBD		
3.						
4.						
5. Totals		$0	$0	$6,503,098		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	(1) Budget Period 1	(2) Budget Period 2	(3)	(4)	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. **Totals** (sum of 6i-6j)					
7. Program Income	$0				$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

APPENDIX

To

SPECIAL TERMS AND CONDITIONS, PROVISION 35

REQUIREMENTS FOR CONTINGENCY FUNDS FOR INTEGRATED BIOREFINERY PROJECTS

TO DE-EE0002884 – Sapphire Energy, Inc. Biorefinery Project

I. Background

Recipients of awards selected under Funding Opportunity Announcement DE-FOA-0000096 are required to provide an initial amount of Contingency funds equal to not less than 25 percent of the Total Project Cost (TPC), subject to the requirements and clarifications provided in this Appendix. TPC includes the approved combined Federal and Recipient cost share funding amounts to accomplish the approved scope in the Statement of Project Objectives that are allowable, reasonable and allocable to the project in accordance with 10 Code of Federal Regulations (CFR) 600.317.

II. Definition

For the purposes of this award, **Contingency** is defined as follows:

A provision in the project management plan to mitigate cost and /or schedule risk (Project Management Body of Knowledge, Third Edition).

III. Requirements

A. Purpose

The Recipient may expend Contingency funds solely for the purpose of mitigating risks to the cost and/or schedule associated with the project performance baseline and consistent with the Risk Mitigation or Management Plan (RMP) and Risk Register. Schedule risks ultimately would be reflected as cost overruns. It is expected that those risks will either be: a) performance baseline schedule and/or cost risks that are identified in the RMP and Risk Register (known risks or opportunities); or, b) to mitigate unknown performance baseline risks or uncertainties that become incorporated into the RMP and Risk Register as they are discovered.

B. Framework and Criteria

1. The framework that governs the use of Contingency funds on the project authorized under this award relies on the Recipient to manage and control project performance baseline risks, opportunities and uncertainties utilizing the most recent, change-controlled performance baseline, Risk RMP and Risk Register. As risks are successfully mitigated throughout the duration of the project, the need for contingency is anticipated to decline. At the point when the performance test has been completed, the number and magnitude of risks and the available project and Contingency funds will need to be evaluated prior to DOE's Critical Decision 4 – Approval of Operations.

2. The initial 25 percent minimum Contingency is calculated based on the TPC (DOE share + Recipient cost share) in dollars. The award is divided into two budget periods – Budget Periods 1 and 2 (BP1 and BP2). BP1 primarily involves relatively low risk activities associated with design work, permitting, environmental baseline data gathering and analysis, financial close, and other activities that should not require significant contingency to be managed effectively. Therefore, for the purposes of this award, the 25% minimum Contingency requirement will be calculated based on the estimated TPC balance that begins with Budget Period 2 (BP2 - construction and operations). The Recipient will need to provide evidence (consistent with evidence standards identified in C. below) of meeting the required 25% minimum Contingency prior to DOE authorizing Critical Decision 3 – Approve Start of Construction. For example, if the BP2 estimate for construction and operations equals a TPC of $100 million, with $50 million DOE funds and $50 million Recipient cost share funds, a minimum of $25 million in initial Contingency funds would be required at the start of BP2. Any increase in the TPC resulting from cost and/or schedule overruns incurred during BP1 will be added to the BP2 TPC before calculating the initial 25% Contingency minimum.

3. Contingency Funds must be: a) liquid, b) immediately available, and c) unrestricted funds that are dedicated to the project.

4. Expenditures of Contingency funds is in addition to the TPC, and cannot count towards cost share. Similarly, expenditures of Contingency cannot result in reimbursement by DOE above the share approved for the project.

5. Contingency is **NOT** to be included in the project budget estimate.

6. The use of Contingency funds cannot be considered allowable costs under the award unless and until Recipient has actually expended such funds to address cost and/or schedule overruns to the performance baseline.

7. Estimated or projected program income CANNOT count towards contingency up front. However, the Recipient may use program income to reimburse actual expenditures of Contingency funds upon approval by the DOE Contracting Officer.

C. Acceptable Evidence of Sufficient Contingency Funds

1. Recipient must provide evidence of Contingency funds that are dedicated to the project and sufficient to meet the 25 percent minimum, which must be documented and reported on a monthly basis consistent with the reporting requirements for this award.

2. Below is a list of the types of evidence the Contracting Officer may consider. Although this list is not all-inclusive, it represents some of the types of documents the Contracting Officer may consider as evidence of adequate Contingency. DOE will review evidence of adequate Contingency provided by the Recipient on a case-by-case basis to determine its acceptability. This evidence may include, but not is not limited to, one or a combination of the following:

   (i) Bank statement of availability of funds

   (ii) Letter of credit

(iii) Evidence of sufficient cash funds (e.g., a letter from the bank or investors certifying to the specific amounts and availability of cash contributions)

(iv) EPC Performance Guarantees

(v) Evidence of funds in an escrowed account dedicated to the project

(vi) Performance bond(s) – Terms and conditions must be approved by the Contracting Officer

3. Self-certification of the availability of Contingency funds is generally **NOT** acceptable evidence. In order for self-certification to be considered acceptable by the Contracting Officer, the following minimum requirements must be met:

a. An executive officer from the Recipient (typically, the Chief Financial Officer) who has control of the disbursement of Contingency funds must:

i. Certify to no less than the minimum required initial specific amount, types and availability of Contingency funds;

ii. Report on the expenditure of those funds monthly to the Contracting Officer; and

iii. Recertify to the specific amount, type and availability of Contingency funds each month.

b. Any Contingency funds expended to address risks and/or opportunities in the performance baseline must be transparent and documented through the most recent approved baseline change control procedure; and

c. The documentation of expenditures of Contingency funds must be transparent such that an independent auditor would be able to easily track the use of such funds through the financial accounting system to the project code of accounts and to the performance baseline cost overruns.

D. Control and Management of Contingency Funds

1. Cost overruns that result in changes to the performance baseline must go through baseline change control. Cost overruns involving the use of Contingency must be documented through the most recent, approved baseline change control procedure. Those cost or schedule overruns that exceed the DOE-approved change control threshold must be approved by DOE. **Exception**: In the situation where an event occurs that compromises safety or threatens human health or the environment, the Recipient is expected to expend the appropriate amount of resources and/or Contingency necessary to manage the event and the project to a safe configuration. Changes to the performance baseline and any cost overruns resulting from the event shall be addressed after the Recipient has achieved a safe project configuration.

2. Any month in which the amount of Contingency becomes insufficient to meet the required minimum, it must be reported to the Contracting Officer within five (5) calendar days of discovery.

3. Incorporation of Contingency within the basis of estimates for each activity shall not be allowed. Activity estimates should be consistent with standard Recipient project estimating methods (e.g., activity-based cost estimating, parametric cost estimating, etc.), but shall avoid the embedding and layering of contingency throughout the Work Breakdown Structure (WBS).

4. At the completion of performance test (as described in the performance baseline), DOE will conduct the Critical Decision 4 (CD-4) – Approval of Operations review. This review will also be the point at which DOE will determine the amount of Contingency the Recipient will be required to have available during the operations phase. The criteria for this determination will be as follows:

    a. Pilot plants – The amount of the Contingency typically required will be based on a minimum of 10 percent of the initial capital cost (BP2 TPC). Using this as a base, the amount of Contingency will be adjusted taking into account risk mitigation trends through the end of the performance test. For example, if the estimate to complete (ETC) and remaining risks through the end of the performance test reflect successful risk mitigation and cost effective project performance management, DOE would factor that into its decision on what percentage contingency will be required for the operations phase. DOE will withhold a percentage of its funds to assure that the operations phase is completed in accordance with the performance baseline and that DOE receives operations data in the form required.

    b. Demonstration plants – The required amount of Contingency typically will be based on a minimum of 10 percent of the initial capital cost (BP2 TPC). Using this as a base, the amount of Contingency will be adjusted using risk mitigation trends through completion of the performance test. For example, if the ETC and risks remaining through the end of the performance test reflect successful risk mitigation and cost effective project performance management, DOE could factor that into its decision on what percentage contingency will be required for the operations phase. Furthermore, if the cost of the core technology exceeds 10 percent of the initial capital cost (BP2 TPC), DOE will factor this into the percentage of DOE funds to be withheld to assure that the operations phase is completed in accordance with the performance baseline.

SPECIAL TERMS AND CONDITIONS

Table of Contents

1. RESOLUTION OF CONFLICTING CONDITIONS

Any apparent inconsistency between Federal statutes and regulations and the terms and conditions contained in this award must be referred to the DOE Award Administrator for guidance.

2. AWARD AGREEMENT TERMS AND CONDITIONS

This award/agreement consists of the Assistance Agreement, plus the following:

a. Special Terms and Conditions.
b. Attachments:

Attachment Number	Title
1.	Intellectual Property Provisions
2.	Statement of Project Objectives
3.	Federal Assistance Reporting Checklist and Instructions
4.	Budget Pages (SF 424A)
5.	Requirements for Contingency Funds for Integrated Biorefinery Projects

c. Applicable program regulations.
d. DOE Assistance Regulations, 10 CFR Part 600 at http://ecfr.gpoaccess.gov.
e. Application/proposal as approved by DOE.
f. National Policy Assurances to be incorporated as award terms in effect on date of award at http://management.energy.gov/business_doe/1374.htm.

3. ELECTRONIC AUTHORIZATION OF AWARD DOCUMENTS

Acknowledgement of award documents by the Recipient's authorized representative through electronic systems used by the Department of Energy, specifically FedConnect, constitutes the Recipient's acceptance of the terms and conditions of the award. Acknowledgement via FedConnect by the Recipient's authorized representative constitutes the Recipient's electronic signature.

4. AWARD PROJECT PERIOD AND BUDGET PERIODS

The Project Period for this award is 12/29/2009 through 09/30/2014, consisting of the following Budget Periods:

Budget Period	Start Date	End Date
1	12/29/2009	09/30/2010
2	10/01/2010	09/30/2014

5. PAYMENT PROCEDURES - REIMBURSEMENT THROUGH THE AUTOMATED CLEARING HOUSE (ACH) VENDER INQUIRY PAYMENT ELECTRONIC REPORTING SYSTEM (VIPERS)

a. Method of Payment. Payment will be made by reimbursement through ACH.

b. Requesting Reimbursement. Requests for reimbursements must be made electronically through Department of Energy's Oak Ridge Financial Service Center (ORFSC) VIPERS. To access and use VIPERS, you must enroll at https://finweb.oro.doe.gov/vipers.htm. Detailed instructions on how to enroll are provided on the web site.

For non-construction awards, you must submit a Standard Form (SF) 270, "Request for Advance or Reimbursement," at https://finweb.oro.doe.gov/vipers.htm and attach a file containing appropriate supporting documentation. The file attachment must show the total Federal share claimed on the SF 270, the non-Federal share claimed for the billing period if cost sharing is required, and cumulative expenditures to date (both Federal and non-Federal) for each of the following categories: salaries/wages and fringe benefits; equipment; travel; participant/training support costs, if any; other direct costs, including subawards/contracts; and indirect costs. For construction awards, you must submit a SF 271, "Outlay Report and Request for Reimbursement for Construction Programs," through VIPERS.

c. Timing of submittals. Submittal of the SF 270 or SF 271 should coincide with your normal billing pattern, but not more frequently than every two weeks. Requests for reimbursement must be limited to the amount of disbursements made during the billing period for the Federal share of direct project costs and the proportionate share of any allowable indirect costs incurred during that billing period.

d. Adjusting payment requests for available cash. You must disburse any funds that are available from repayments to and interest earned on a revolving fund, program income, rebates, refunds, contract settlements, audit recoveries, credits, discounts, and interest earned on any of those funds before requesting additional cash payments from DOE.

e. Payments. The DOE approving official will approve the invoice as soon as practical, but not later than 30 days after your request is received, unless the billing is improper. Upon receipt of an invoice payment authorization from the DOE approving official, the ORFSC will disburse payment to you. You may check the status of payments at the VIPER web site. All payments are made by electronic funds transfer to the bank account identified on the ACH Vendor/Miscellaneous Payment Enrollment Form (SF 3881) that you filed.

6. COST SHARING

a. Total Estimated Project Cost is the sum of the Federal Government share, including Federally Funded Research and Development Center (FFRDC) contractor costs, and Recipient share of the estimated project costs. The DOE FFRDC contractor cost is not included in the total approved budget for this award, because DOE will pay the DOE FFRDC contractor portion of the effort under an existing DOE contract. The Recipient is not responsible for reporting on that portion of the total estimated cost that is paid directly to the DOE FFRDC contractor.

The Recipient's cost share must come from non-Federal sources unless otherwise allowed by law. By accepting Federal funds under this award, you agree that you are liable for your percentage share of allowable project costs, on a budget period basis, even if the project is terminated early or is not funded to its completion. This cost is shared as follows:

Budget Period	DOE Cost Share, including FFRDC Costs		Recipient Cost Share $ / %	Total Estimated Costs
	DOE $ / %	FFRDC $ / %		
1	$6,503,098 / Ex.4	$275,000 /Ex.4	Redacted Exemption 4	
2	TBD	TBD		
Total Project	TBD	TBD		

b. If you discover that you may be unable to provide cost sharing of at least the amount identified in paragraph a of this Article, you should immediately provide written notification to the DOE Award Administrator, indicating whether you will continue the project or phase out the project. If you plan to continue the project, the notification must describe how replacement cost sharing will be secured.

c. You must maintain records of all project costs you claim as cost sharing, including in-kind costs, as well as records of costs to be paid by DOE. Such records are subject to audit.

d. Failure to provide the cost share required by this Article may result in the subsequent recovery by DOE of some or all the funds provided under the award.

7. REBUDGETING AND RECOVERY OF INDIRECT COSTS

a. If actual allowable indirect costs are less than those budgeted and funded under the award, you may use the difference to pay additional allowable direct costs during the project period. If at the completion of the award the Government's share of total allowable costs (i.e., direct and indirect), is less than the total costs reimbursed, you must refund the difference.

b. Recipients are expected to manage their indirect costs. DOE will not amend an award solely to provide additional funds for changes in indirect cost rates. DOE recognizes that the inability to obtain full reimbursement for indirect costs means the Recipient must absorb the underrecovery. Such underrecovery may be allocated as part of the organization's required cost sharing**.**

8. FINAL INCURRED COST AUDIT

In accordance with 10 CFR 600, DOE reserves the right to initiate a final incurred cost audit on this award. If the audit has not been performed or completed prior to the closeout of the award, DOE retains the right to recover an appropriate amount after fully considering the recommendations on disallowed costs resulting from the final audit.

9. STATEMENT OF FEDERAL STEWARDSHIP

DOE will exercise normal Federal stewardship in overseeing the project activities performed under this award. Stewardship activities include, but are not limited to, conducting site visits; reviewing performance and financial reports; providing technical assistance and/or temporary intervention in unusual circumstances to correct deficiencies which develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the award objectives have been accomplished.

10. STATEMENT OF SUBSTANTIAL INVOLVEMENT

1. Government Insight

   In order to adequately monitor project progress and provide technical direction and/or redirection to the Recipient, DOE must be provided an adequate level of insight into various Recipient activities. Government Insight activities by DOE include attendance at Recipient meetings, reviews and tests, as well as access for DOE's consultants to perform independent evaluations of Recipient's plans and processes. Recipient shall notify the DOE Project Officer of meetings, reviews, and tests in sufficient time to permit DOE participation, and provide all appropriate documentation for DOE review.

2. Specific activities to be conducted by DOE:

   a. Risk Evaluation – DOE will review the Recipient's initial Risk Mitigation Plan (RMP) for quality and completeness. DOE will also monitor updates to the RMP and actions taken by the Recipient during the performance of its award to mitigate risks and improve the probability of successful execution of the integrated Biorefinery project. At DOE's discretion, additional independent risk analyses of the project by DOE consultants may be requested.

b. Independent Engineering Assessments – DOE will engage a private, independent engineering (IE) firm to assist in assessing the progress of the project and provide timely and accurate reports to DOE. The Recipient will ensure that the IE has access to any and all relevant documentation sufficient to allow the IE to provide independent evaluations to DOE on the progress of the project. Such documentation includes but is not limited to the following:

- Drawings and specifications
- Construction and Execution plans
- Resource loaded schedules
- Design functions and requirements for the site final design review
- Risk management plans
- Value management and engineering studies and/or plans
- Acquisition strategies
- Project execution plans
- Project controls including earned value management systems
- Qualifications of the integrated project team.
- Financial strategy for funding the construction project
- Updated marketing and business plan
- Invoices submitted to DOE

DOE will evaluate the quality and completeness of information and documentation provided by the Recipient to DOE and its consultants in order to allow DOE to provide technical direction and/or redirection to the Recipient about how best to achieve the purposes of the award. Consultants to DOE may not provide technical direction and/or redirection to the Recipient.

11. SITE VISITS

DOE's authorized representatives have the right to make site visits at reasonable times to review project accomplishments and management control systems and to provide technical assistance, if required. You must provide, and must require your subawardees to provide, reasonable access to facilities, office space, resources, and assistance for the safety and convenience of the government representatives in the performance of their duties. All site visits and evaluations must be performed in a manner that does not unduly interfere with or delay the work.

12. REPORTING REQUIREMENTS

a. Requirements. The reporting requirements for this award are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to this award. Failure to comply with these reporting requirements is considered a material noncompliance with the terms of the award. Noncompliance may result in withholding of future payments, suspension or termination of the current award, and withholding of future awards. A willful failure to perform, a history of failure to perform, or unsatisfactory performance of this and/or other financial assistance awards, may also result in a debarment action to preclude future awards by Federal agencies.

b. Dissemination of scientific/technical reports. Scientific/technical reports submitted under this award will be disseminated on the Internet via the DOE Information Bridge (www.osti.gov/bridge), unless the report contains patentable material, protected data or SBIR/STTR data. Citations for journal articles produced under the award will appear on the DOE Energy Citations Database (www.osti.gov/energycitations).

c. Restrictions. Reports submitted to the DOE Information Bridge must not contain any Protected Personal Identifiable Information (PII), limited rights data (proprietary data), classified information, information subject to export control classification, or other information not subject to release.

13. PUBLICATIONS

a. You are encouraged to publish or otherwise make publicly available the results of the work conducted under the award.

b. An acknowledgment of DOE support and a disclaimer must appear in the publication of any material, whether copyrighted or not, based on or developed under this project, as follows:

> *Acknowledgment*: "This material is based upon work supported by the Department of Energy [National Nuclear Security Administration] [add name(s) of other agencies, if applicable] under Award Number(s) [enter the award number(s)]."
>
> *Disclaimer*: "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."

14. FEDERAL, STATE, AND MUNICIPAL REQUIREMENTS

You must obtain any required permits and comply with applicable federal, state, and municipal laws, codes, and regulations for work performed under this award.

15. INTELLECTUAL PROPERTY PROVISIONS AND CONTACT INFORMATION

a. The intellectual property provisions applicable to this award are provided as an attachment to this award or are referenced in the Agreement Cover Page.

b. Questions regarding intellectual property matters should be referred to the DOE Award Administrator identified and the Patent Counsel designated as the service provider for the DOE office that issued the award.

Patent Counsel for the Golden Field Office is Julia Moody, who may be reached at julia.moody@go.doe.gov or 303-275-4867.

16. NATIONAL SECURITY: CLASSIFIABLE RESULTS ORIGINATING UNDER AN AWARD

a. This award is intended for unclassified, publicly releasable research. You will not be granted access to classified information. DOE does not expect that the results of the research project will involve classified information. Under certain circumstances, however, a classification review of information originated under the award may be required. The Department may review research work generated under this award at any time to determine if it requires classification.

b. Executive Order 12958 (60 Fed. Reg. 19,825 (1995)) states that basic scientific research information not clearly related to the national security shall not be classified. Nevertheless, some information concerning (among other things) scientific, technological, or economic matters relating to national security or cryptology may require classification. If you originate information during the course of this award that you believe requires classification, you must promptly:

1. Notify the DOE Project Officer and the DOE Award Administrator;

2. Submit the information by registered mail directly to the Director, Office of Classification and Information Control, SO-10.2; U.S. Department of Energy; P.O. Box A; Germantown, MD 20875-0963, for classification review.

3. Restrict access to the information to the maximum extent possible until you are informed that the information is not classified, but no longer than 30 days after receipt by the Director, Office of Classification and Information Control

c. If you originate information concerning the production or utilization of special nuclear material (i.e., plutonium, uranium enriched in the isotope 233 or 235, and any other material so determined under section 51 of the Atomic Energy Act) or nuclear energy, you must:

   1. Notify the DOE Project Officer and the DOE Award Administrator;

   2. Submit the information by registered mail directly to the Director, Office of Classification and Information Control, SO-10.2; U.S. Department of Energy; P. O. Box A; Germantown, MD 20875-0963 for classification review within 180 days of the date the Recipient first discovers or first has reason to believe that the information is useful in such production or utilization; and

   3. Restrict access to the information to the maximum extent possible until you are informed that the information is not classified, but no longer than 90 days after receipt by the Director, Office of Classification and Information Control.

d. If DOE determines any of the information requires classification, you agree that the Government may terminate the award by mutual agreement in accordance with 10 CFR 600.25(d). All material deemed to be classified must be forwarded to DOE, in a manner specified by DOE.

e. If DOE does not respond within the specified time periods, you are under no further obligation to restrict access to the information.

17. CONTINUATION APPLICATION AND FUNDING

a. Continuation Application. A continuation application is a non-competitive application for an additional budget period within a previously approved project period. At least 60 days before the end of each budget period, your continuation application must be submitted to the DOE Project Officer and the DOE Award Administrator identified in the Assistance Agreement, to be eligible to receive a continuation award for the next budget period. The continuation application must include the following information:

   1. Application for Federal Assistance, SF-424.

   2. A continuation report, which must provide a summary of the progress towards meeting the objectives of the award, including any significant findings, conclusions, or developments, a comparison of actual accomplishment with the objectives established for the reporting period (milestones, deliverables, decision point criteria and stage gates), reasons for slippage if goals were not met, an estimate of any unobligated balances remaining at the end of the budget period, and when applicable an explanation of cost overruns or underruns. A description of your plans for the award during the upcoming budget period and any variance from the DOE approved objectives needs to be included in the continuation application package.

3. A detailed budget and supporting justification for the upcoming budget period with the supporting documentation below, including an estimate of DOE funds expected to be remaining at the end of the current budget period:

   a) Budget Information – Non Construction Programs, SF-424A.

   b) Cost Reasonableness Determination, PMC 123.1 (Excel Version).

4. Environmental Checklist, EF1, (This form should be completed on-line at https://www.eere-pmc.energy.gov/).

5. Commitment Letters from Third Parties Contributing to Cost Sharing, if applicable.

6. Statement of Project Objectives (SOPO), if revision is required.

b. Continuation Funding. Continuation funding is contingent on: (1) availability of funds; (2) meeting the objectives, milestones, deliverables, decision point criteria and stage gates of your award and obtaining approval from DOE to continue work on the project (DOE authorizing either Pass or Redirect through a stage-gate review); (3) submittal of required reports; or (4) compliance with the terms and conditions of the award.

18. LOBBYING RESTRICTIONS

By accepting funds under this award, you agree that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

19. NOTICE REGARDING THE PURCHASE OF AMERICAN-MADE EQUIPMENT AND PRODUCTS -- SENSE OF CONGRESS

It is the sense of the Congress that, to the greatest extent practicable, all equipment and products purchased with funds made available under this award should be American-made.

20. FUNDING OF BUDGET PERIODS

DOE has obligated $50,000,000 for completion of the project authorized by this agreement; however, only $6,778,098 is available for work performed by the Recipient during Budget Period 1 of the project. For Budget Period 2, the remainder or $43,221,902 will be available contingent upon the submission by the Recipient of a continuation application and written approval of the continuation application by the DOE Contracting Officer.

In the event that the Recipient does not submit a continuation application for subsequent Budget Periods, or DOE disapproves a continuation application for subsequent Budget Periods, the maximum DOE liability to the Recipient is the funds that are available for the

current approved Budget Period. In such event, DOE reserves the right to deobligate any remaining funds.

21. PROPERTY

Real property and equipment acquired by the Recipient shall be subject to the rules set forth in 10 CFR 600.130-137, 10 CFR 600.231-233, or 10 CFR 600.320-324, as applicable.

Consistent with the goals and objectives of this project, the Recipient may continue to use Recipient acquired property beyond the Period of Performance, without obligation, during the period of such use, to extinguish DOE's conditional title to such property as described in 10 CFR 600.132-135, 10 CFR 600.231-233, or 600.321-324, subject to the following: (a) the Recipient continues to utilize such property for the objectives of the project as set forth in the Statement of Project Objectives; (b) DOE retains the right to periodically ask for, and the Recipient agrees to provide, reasonable information concerning the use and condition of the property; and (c) the Recipient follows the property disposition rules set forth in the applicable sections of 10 CFR Part 600, if the property is no longer used by the Recipient for the objectives of the project, and the fair market value of property exceeds $5,000.

Once the per unit fair market value of the property is less than $5,000, pursuant to the applicable sections of 10 CFR Part 600, DOE's residual interest in the property shall be extinguished and the Recipient shall have no further obligation to the DOE with respect to the property.

The regulations as set forth in 10 CFR Part 600 and the requirements of this article shall also apply to property in the possession of any team member, sub-recipient or other entity where such property was acquired in whole or in part with funds provided by DOE under this award or where such property was counted as cost-sharing under the award.

22. DECONTAMINATION AND/OR DECOMMISSIONING (D&D) COSTS

Notwithstanding any other provisions of this Agreement, the Government shall not be responsible for or have any obligation to the Recipient for (i) Decontamination and/or Decommissioning (D&D) of any of the Recipient's facilities, or (ii) any costs which may be incurred by the Recipient in connection with the D&D of any of its facilities due to the performance of the work under this Agreement, whether said work was performed prior to or subsequent to the effective date of the Agreement.

23. AT RISK FOR FINANCIAL CAPABILITY

You have been determined to be at risk for financial capability based on the Dun & Bradstreet (D&B) Business Information Report (BIR).

Based on this determination the following requirement has been incorporated into this award: Method of payment will be reimbursement through the Automated Clearing House (ACH) Vendor Inquiry Payment Electronic Reporting System (VIPERS).

You may report any change in circumstances that impact DOE's determination of your financial capability. If you feel that your circumstances have changed to this degree, you may request a re-evaluation at any time after 6 months from the initial determination. Please provide a written request and support to the DOE Award Administrator.

DOE will remove this provision by modification to the award if the conditions that prompted it have been corrected, as approved by the Contracting Officer.

24. INSOLVENCY, BANKRUPTCY OR RECEIVERSHIP

a. You shall immediately notify the DOE of the occurrence of any of the following events: (i) you or your parent's filing of a voluntary case seeking liquidation or reorganization under the Bankruptcy Act; (ii) your consent to the institution of an involuntary case under the Bankruptcy Act against you or your parent; (iii) the filing of any similar proceeding for or against you or your parent, or your consent to the dissolution, winding-up or readjustment of your debts, appointment of a receiver, conservator, trustee, or other officer with similar powers over you, under any other applicable state or federal law; or (iv) your insolvency due to its inability to pay debts generally as they become due.

b. Such notification shall be in writing and shall: (i) specifically set out the details of the occurrence of an event referenced in paragraph (a); (ii) provide the facts surrounding that event; and (iii) provide the impact such event will have on the project being funded by this award.

c. Upon the occurrence of any of the four events described in paragraph a. of this provision, DOE reserves the right to conduct a review of your award to determine your compliance with the required elements of the award (including such items as cost share, progress towards technical project objectives, and submission of required reports). If the DOE review determines that there are significant deficiencies or concerns with your performance under the award, DOE reserves the right to impose additional requirements, as needed, including (i) change of payment method; or (ii) institute payment controls.

d. Failure of the Recipient to comply with this provision may be considered a material noncompliance of this financial assistance award by the Contracting Officer.

25. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) REQUIREMENTS

You are restricted from taking any action using federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE/NNSA providing either a NEPA clearance or a final NEPA decision regarding the project.

Prohibited actions include:
BP1 ground disturbing activities are prohibited until mitigative measures 1 and 2 from the USDA FONSI are met.

Also, final design, capital equipment purchase, site preparation, construction and operation activities are prohibited at this time.

This restriction does not preclude you from: Budget Period 1 activities.

If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

You are required to:
1. Minimize the likelihood of adverse impacts to birds protected under the Migratory Bird Treaty Act by completing nesting bird surveys in areas to be disturbed during BP1. If nesting birds occupy the area to be disturbed during BP1, all ground disturbing activities should be avoided until nesting is complete.

2. Coordinate with USFWS and NMDFG in order to minimize potential impacts to any burrowing owls located on the site, if present, as outlined in the "Guidelines and Recommendations for Burrowing Owl Surveys and Mitigation" (July 2007)

Results of the nesting bird and burrowing owl surveys must be submitted to DOE for review and approval prior to DOE or cost share funds being applied to any ground disturbing activities.

If this award includes construction activities, you must submit an environmental evaluation report/evaluation notification form addressing NEPA issues prior to DOE initiating the NEPA process.

26. INDEMNITY

The Recipient shall indemnify the Government and its officers, agents, or employees for any and all liability, including litigation expenses and attorneys' fees, arising from suits, actions, or claims of any character for death, bodily injury, or loss of or damage to property or to the environment, resulting from the project, except to the extent that such liability results from the direct fault or negligence of Government officers, agents or employees, or to the extent such liability may be covered by applicable allowable costs provisions.

27. SPECIAL PROVISIONS RELATING TO WORK FUNDED UNDER AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (May 2009)

Preamble

The American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, (Recovery Act) was enacted to preserve and create jobs and promote economic recovery, assist those most impacted by the recession, provide investments needed to increase economic efficiency by spurring technological advances in science and health, invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits, stabilize State and local government budgets, in order to minimize and avoid reductions in essential services and counterproductive State and local tax increases. Recipients shall use grant funds in a manner that maximizes job creation and economic benefit.

The Recipient shall comply with all terms and conditions in the Recovery Act relating generally to governance, accountability, transparency, data collection and resources as specified in Act itself and as discussed below.

Recipients should begin planning activities for their first tier subrecipients, including obtaining a DUNS number (or updating the existing DUNS record), and registering with the Central Contractor Registration (CCR).

Be advised that Recovery Act funds can be used in conjunction with other funding as necessary to complete projects, but tracking and reporting must be separate to meet the reporting requirements of the Recovery Act and related guidance. For projects funded by sources other than the Recovery Act, Contractors must keep separate records for Recovery Act funds and to ensure those records comply with the requirements of the Act.

The Government has not fully developed the implementing instructions of the Recovery Act, particularly concerning specific procedural requirements for the new reporting requirements. The Recipient will be provided these details as they become available. The Recipient must comply with all requirements of the Act. If the recipient believes there is any inconsistency between ARRA requirements and current award terms and conditions, the issues will be referred to the Contracting Officer for reconciliation.

Definitions

For purposes of this clause, Covered Funds means funds expended or obligated from appropriations under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5. Covered Funds will have special accounting codes and will be identified as Recovery Act funds in the grant, cooperative agreement or TIA and/or modification using Recovery Act funds. Covered Funds must be reimbursed by September 30, 2015.

Non-Federal employer means any employer with respect to covered funds -- the contractor, subcontractor, grantee, or recipient, as the case may be, if the contractor, subcontractor, grantee, or recipient is an employer; and any professional membership organization, certification of other

professional body, any agent or licensee of the Federal government, or any person acting directly or indirectly in the interest of an employer receiving covered funds; or with respect to covered funds received by a State or local government, the State or local government receiving the funds and any contractor or subcontractor receiving the funds and any contractor or subcontractor of the State or local government; and does not mean any department, agency, or other entity of the federal government.

Recipient means any entity that receives Recovery Act funds directly from the Federal government (including Recovery Act funds received through grant, loan, or contract) other than an individual and includes a State that receives Recovery Act Funds.

Special Provisions

A. Flow Down Requirement

Recipients must include these special terms and conditions in any subaward.

B. Segregation of Costs

Recipients must segregate the obligations and expenditures related to funding under the Recovery Act. Financial and accounting systems should be revised as necessary to segregate, track and maintain these funds apart and separate from other revenue streams. No part of the funds from the Recovery Act shall be commingled with any other funds or used for a purpose other than that of making payments for costs allowable for Recovery Act projects.

C. Prohibition on Use of Funds

None of the funds provided under this agreement derived from the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, may be used by any State or local government, or any private entity, for any casino or other gambling establishment, aquarium, zoo, golf course, or swimming pool.

D. Access to Records

With respect to each financial assistance agreement awarded utilizing at least some of the funds appropriated or otherwise made available by the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, any representative of an appropriate inspector general appointed under section 3 or 8G of the Inspector General Act of 1988 (5 U.S.C. App.) or of the Comptroller General is authorized --

(1) to examine any records of the contractor or grantee, any of its subcontractors or subgrantees, or any State or local agency administering such contract that pertain to, and involve transactions that relate to, the subcontract, subcontract, grant, or subgrant; and

(2) to interview any officer or employee of the contractor, grantee, subgrantee, or agency regarding such transactions.

E. Publication

An application may contain technical data and other data, including trade secrets and/or privileged or confidential information, which the applicant does not want disclosed to the public or used by the Government for any purpose other than the application. To protect such data, the applicant should specifically identify each page including each line or paragraph thereof containing the data to be protected and mark the cover sheet of the application with the following Notice as well as referring to the Notice on each page to which the Notice applies:

Notice of Restriction on Disclosure and Use of Data
The data contained in pages ---- of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data here to the extent provided in the award. This restriction does not limit the Government's right to use or disclose data obtained without restriction from any source, including the applicant.

Information about this agreement will be published on the Internet and linked to the website www.recovery.gov, maintained by the Accountability and Transparency Board. The Board may exclude posting contractual or other information on the website on a case-by-case basis when necessary to protect national security or to protect information that is not subject to disclosure under sections 552 and 552a of title 5, United States Code.

F. Protecting State and Local Government and Contractor Whistleblowers.

The requirements of Section 1553 of the Act are summarized below. They include, but are not limited to:

Prohibition on Reprisals: An employee of any non-Federal employer receiving covered funds under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, may not be discharged, demoted, or otherwise discriminated against as a reprisal for disclosing, including a disclosure made in the ordinary course of an employee's duties, to the Accountability and Transparency Board, an inspector general, the Comptroller General, a member of Congress, a State or Federal regulatory or law enforcement agency, a person with supervisory authority over the employee (or other person working for the employer who has the authority to investigate, discover or terminate misconduct), a court or grant jury, the head of a Federal agency, or their representatives information that the employee believes is evidence of:

- gross management of an agency contract or grant relating to covered funds;
- a gross waste of covered funds;
- a substantial and specific danger to public health or safety related to the implementation or use of covered funds;
- an abuse of authority related to the implementation or use of covered funds; or
- as violation of law, rule, or regulation related to an agency contract (including the competition for or negotiation of a contract) or grant, awarded or issued relating to covered funds.

Agency Action: Not later than 30 days after receiving an inspector general report of an alleged reprisal, the head of the agency shall determine whether there is sufficient basis to conclude that the non-Federal employer has subjected the employee to a prohibited reprisal. The agency shall either issue an order denying relief in whole or in part or shall take one or more of the following actions:

- Order the employer to take affirmative action to abate the reprisal.
- Order the employer to reinstate the person to the position that the person held before the reprisal, together with compensation including back pay, compensatory damages, employment benefits, and other terms and conditions of employment that would apply to the person in that position if the reprisal had not been taken.
- Order the employer to pay the employee an amount equal to the aggregate amount of all costs and expenses (including attorneys' fees and expert witnesses' fees) that were reasonably incurred by the employee for or in connection with, bringing the complaint regarding the reprisal, as determined by the head of a court of competent jurisdiction.

Nonenforceablity of Certain Provisions Waiving Rights and remedies or Requiring Arbitration: Except as provided in a collective bargaining agreement, the rights and remedies provided to aggrieved employees by this section may not be waived by any agreement, policy, form, or condition of employment, including any predispute arbitration agreement. No predispute arbitration agreement shall be valid or enforceable if it requires arbitration of a dispute arising out of this section.

Requirement to Post Notice of Rights and Remedies: Any employer receiving covered funds under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, shall post notice of the rights and remedies as required therein. (Refer to section 1553 of the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, www.Recovery.gov, for specific requirements of this section and prescribed language for the notices.).

G. Request for Reimbursement

RESERVED

H. False Claims Act

Recipient and sub-recipients shall promptly refer to the DOE or other appropriate Inspector General any credible evidence that a principal, employee, agent, contractor, sub-grantee, subcontractor or other person has submitted a false claim under the False Claims Act or has committed a criminal or civil violation of laws pertaining to fraud, conflict of interest, bribery, gratuity or similar misconduct involving those funds.

I. Information in Support of Recovery Act Reporting

Recipient may be required to submit backup documentation for expenditures of funds under the Recovery Act including such items as timecards and invoices. Recipient shall provide copies of backup documentation at the request of the Contracting Officer or designee.

J. Availability of Funds

Funds appropriated under the Recovery Act and obligated to this award are available for reimbursement of costs until September 30, 2015.

28. REPORTING AND REGISTRATION REQUIREMENTS UNDER SECTION 1512 OF THE RECOVERY ACT

(a) This award requires the recipient to complete projects or activities which are funded under the American Recovery and Reinvestment Act of 2009 (Recovery Act) and to report on use of Recovery Act funds provided through this award. Information from these reports will be made available to the public.

(b) The reports are due no later than ten calendar days after each calendar quarter in which the Recipient receives the assistance award funded in whole or in part by the Recovery Act.

(c) Recipients and their first-tier subrecipients must maintain current registrations in the Central Contractor Registration (*http://www.ccr.gov*) at all times during which they have active federal awards funded with Recovery Act funds. A Dun and Bradstreet Data Universal Numbering System (DUNS) Number (*http://www.dnb.com*) is one of the requirements for registration in the Central Contractor Registration.

(d) The recipient shall report the information described in section 1512(c) of the Recovery Act using the reporting instructions and data elements that will be provided online at *http://www.FederalReporting.gov* and ensure that any information that is pre-filled is corrected or updated as needed.

29. REQUIRED USE OF AMERICAN IRON, STEEL, AND MANUFACTURED GOODS – SECTION 1605 OF THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009

If the Recipient determines at any time that any construction, alteration, or repair activity on a public building or public works will be performed during the course of the project, the Recipient shall notify the Contracting Officer prior to commencing such work and the following provisions shall apply.

(a) *Definitions.* As used in this award term and condition—

(1) *Manufactured good* means a good brought to the construction site for incorporation into the building or work that has been—

(i) Processed into a specific form and shape; or

(ii) Combined with other raw material to create a material that has different properties than the properties of the individual raw materials.

(2) *Public building and public work* means a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.

(3) *Steel* means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

(b) *Domestic preference.* (1) This award term and condition implements Section 1605 of the American Recovery and Reinvestment Act of 2009 (Recovery Act) (Pub. L. 111–5), by requiring that all iron, steel, and manufactured goods used in the project are produced in the United States except as provided in paragraph (b)(3) of this section and condition.

(2) This requirement does not apply to the material listed by the Federal Government as follows:

None

(3) The award official may add other iron, steel, and/or manufactured goods to the list in paragraph (b)(2) of this section and condition if the Federal Government determines that—

(i) The cost of the domestic iron, steel, and/or manufactured goods would be unreasonable. The cost of domestic iron, steel, or manufactured goods used in the project is unreasonable when the cumulative cost of such material will increase the cost of the overall project by more than 25 percent;

(ii) The iron, steel, and/or manufactured good is not produced, or manufactured in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(iii) The application of the restriction of section 1605 of the Recovery Act would be inconsistent with the public interest.

(c) *Request for determination of inapplicability of Section 1605 of the Recovery Act* . (1)(i) Any recipient request to use foreign iron, steel, and/or manufactured goods in accordance with paragraph (b)(3) of this section shall include adequate information for Federal Government evaluation of the request, including—

(A) A description of the foreign and domestic iron, steel, and/or manufactured goods;

(B) Unit of measure;

(C) Quantity;

(D) Cost;

(E) Time of delivery or availability;

(F) Location of the project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign iron, steel, and/or manufactured goods cited in accordance with paragraph (b)(3) of this section.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed cost comparison table in the format in paragraph (d) of this section.

(iii) The cost of iron, steel, and/or manufactured goods material shall include all delivery costs to the construction site and any applicable duty.

(iv) Any recipient request for a determination submitted after Recovery Act funds have been obligated for a project for construction, alteration, maintenance, or repair shall explain why the recipient could not reasonably foresee the need for such determination and could not have requested the determination before the funds were obligated. If the recipient does not submit a satisfactory explanation, the award official need not make a determination.

(2) If the Federal Government determines after funds have been obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official will amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is the unreasonable cost of the domestic iron, steel, or manufactured goods, the award official shall adjust the award amount or redistribute budgeted funds by at least the differential established in 2 CFR 176.110(a).

(3) Unless the Federal Government determines that an exception to section 1605 of the Recovery Act applies, use of foreign iron, steel, and/or manufactured goods is noncompliant with section 1605 of the American Recovery and Reinvestment Act.

(d) *Data.* To permit evaluation of requests under paragraph (b) of this section based on unreasonable cost, the Recipient shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Items Cost Comparison

Description	Unit of measure	Quantity	Cost (dollars)*
Item 1:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____
Item 2:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____

List name, address, telephone number, email address, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.

Include other applicable supporting information.

*Include all delivery costs to the construction site.

30. REQUIRED USE OF AMERICAN IRON, STEEL, AND MANUFACTURED GOODS (COVERED UNDER INTERNATIONAL AGREEMENTS) – SECTION 1605 OF THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009

(a) *Definitions.* As used in this award term and condition—

Designated country — (1) A World Trade Organization Government Procurement Agreement country (Aruba, Austria, Belgium, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea (Republic of), Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and United Kingdom;

(2) A Free Trade Agreement (FTA) country (Australia, Bahrain, Canada, Chile, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Mexico, Morocco, Nicaragua, Oman, Peru, or Singapore); or

(3) A United States-European Communities Exchange of Letters (May 15, 1995) country: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and United Kingdom.

Designated country iron, steel, and/or manufactured goods — (1) Is wholly the growth, product, or manufacture of a designated country; or

(2) In the case of a manufactured good that consist in whole or in part of materials from another country, has been substantially transformed in a designated country into a new and different manufactured good distinct from the materials from which it was transformed.

Domestic iron, steel, and/or manufactured good — (1) Is wholly the growth, product, or manufacture of the United States; or

(2) In the case of a manufactured good that consists in whole or in part of materials from another country, has been substantially transformed in the United States into a new and different manufactured good distinct from the materials from which it was transformed. There is no requirement with regard to the origin of components or subcomponents in manufactured goods or products, as long as the manufacture of the goods occurs in the United States.

Foreign iron, steel, and/or manufactured good means iron, steel and/or manufactured good that is not domestic or designated country iron, steel, and/or manufactured good.

Manufactured good means a good brought to the construction site for incorporation into the building or work that has been—

(1) Processed into a specific form and shape; or

(2) Combined with other raw material to create a material that has different properties than the properties of the individual raw materials.

Public building and *public work* means a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

(b) *Iron, steel, and manufactured goods.* (1) The award term and condition described in this section implements—

(i) Section 1605(a) of the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5) (Recovery Act), by requiring that all iron, steel, and manufactured goods used in the project are produced in the United States; and

(ii) Section 1605(d), which requires application of the Buy American requirement in a manner consistent with U.S. obligations under international agreements. The restrictions of section 1605 of the Recovery Act do not apply to designated country iron, steel, and/or manufactured goods.

The Buy American requirement in section 1605 shall not be applied where the iron, steel or manufactured goods used in the project are from a Party to an international agreement that obligates the recipient to treat the goods and services of that Party the same as domestic goods and services. This obligation shall only apply to projects with an estimated value of $7,443,000 or more.

(2) The recipient shall use only domestic or designated country iron, steel, and manufactured goods in performing the work funded in whole or part with this award, except as provided in paragraphs (b)(3) and (b)(4) of this section.

(3) The requirement in paragraph (b)(2) of this section does not apply to the iron, steel, and manufactured goods listed by the Federal Government as follows:

None

(4) The award official may add other iron, steel, and manufactured goods to the list in paragraph (b)(3) of this section if the Federal Government determines that—

(i) The cost of domestic iron, steel, and/or manufactured goods would be unreasonable. The cost of domestic iron, steel, and/or manufactured goods used in the project is unreasonable when the cumulative cost of such material will increase the overall cost of the project by more than 25 percent;

(ii) The iron, steel, and/or manufactured good is not produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality; or

(iii) The application of the restriction of section 1605 of the Recovery Act would be inconsistent with the public interest.

(c) *Request for determination of inapplicability of section 1605 of the Recovery Act or the Buy American Act.* (1)(i) Any recipient request to use foreign iron, steel, and/or manufactured goods in accordance with paragraph (b)(4) of this section shall include adequate information for Federal Government evaluation of the request, including—

(A) A description of the foreign and domestic iron, steel, and/or manufactured goods;

(B) Unit of measure;

(C) Quantity;

(D) Cost;

(E) Time of delivery or availability;

(F) Location of the project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign iron, steel, and/or manufactured goods cited in accordance with paragraph (b)(4) of this section.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed cost comparison table in the format in paragraph (d) of this section.

(iii) The cost of iron, steel, or manufactured goods shall include all delivery costs to the construction site and any applicable duty.

(iv) Any recipient request for a determination submitted after Recovery Act funds have been obligated for a project for construction, alteration, maintenance, or repair shall explain why the recipient could not reasonably foresee the need for such determination and could not have requested the determination before the funds were obligated. If the recipient does not submit a satisfactory explanation, the award official need not make a determination.

(2) If the Federal Government determines after funds have been obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official will amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other appropriate actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is the unreasonable cost of the domestic iron, steel, or manufactured goods, the award official shall adjust the award amount or redistribute budgeted funds, as appropriate, by at least the differential established in 2 CFR 176.110(a).

(3) Unless the Federal Government determines that an exception to section 1605 of the Recovery Act applies, use of foreign iron, steel, and/or manufactured goods other than designated country iron, steel, and/or manufactured goods is noncompliant with the applicable Act.

(d) *Data.* To permit evaluation of requests under paragraph (b) of this section based on unreasonable cost, the applicant shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Items Cost Comparison

Description	Unit of measure	Quantity	Cost (dollars)*
Item 1:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____
Item 2:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____

List name, address, telephone number, email address, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.

Include other applicable supporting information.

*Include all delivery costs to the construction site.

31. RECOVERY ACT TRANSACTIONS LISTED IN SCHEDULE OF EXPENDITURES OF FEDERAL AWARDS AND RECIPIENT RESPONSIBILITIES FOR INFORMING SUBRECIPIENTS

(a) To maximize the transparency and accountability of funds authorized under the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5) (Recovery Act) as required by Congress and in accordance with 2 CFR 215.21 "Uniform Administrative Requirements for Grants and Agreements" and OMB Circular A–102 Common Rules provisions, recipients agree to maintain records that identify adequately the source and application of Recovery Act funds. OMB Circular A–102 is available at *http://www.whitehouse.gov/omb/circulars/a102/a102.html.*

(b) For recipients covered by the Single Audit Act Amendments of 1996 and OMB Circular A–133, "Audits of States, Local Governments, and Non-Profit Organizations," recipients agree to separately identify the expenditures for Federal awards under the Recovery Act on the Schedule of Expenditures of Federal Awards (SEFA) and the Data Collection Form (SF–SAC) required by OMB Circular A–133. OMB Circular A–133 is available at *http://www.whitehouse.gov/omb/circulars/a133/a133.html.* This shall be accomplished by identifying expenditures for Federal awards made under the Recovery Act separately on the SEFA, and as separate rows under Item 9 of Part III on the SF–SAC by CFDA number, and inclusion of the prefix "ARRA-" in identifying the name of the Federal program on the SEFA and as the first characters in Item 9d of Part III on the SF–SAC.

(c) Recipients agree to separately identify to each subrecipient, and document at the time of subaward and at the time of disbursement of funds, the Federal award number, CFDA number, and amount of Recovery Act funds. When a recipient awards Recovery Act funds for an existing program, the information furnished to subrecipients shall distinguish the subawards of incremental Recovery Act funds from regular subawards under the existing program.

(d) Recipients agree to require their subrecipients to include on their SEFA information to specifically identify Recovery Act funding similar to the requirements for the recipient SEFA described above. This information is needed to allow the recipient to properly monitor subrecipient expenditure of ARRA funds as well as oversight by the Federal awarding agencies, Offices of Inspector General and the Government Accountability Office.

32. WAGE RATE REQUIREMENTS UNDER SECTION 1606 OF THE RECOVERY ACT

(a) Section 1606 of the Recovery Act requires that all laborers and mechanics employed by contractors and subcontractors on projects funded directly by or assisted in whole or in part by and through the Federal Government pursuant to the Recovery Act shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code.

Pursuant to Reorganization Plan No. 14 and the Copeland Act, 40 U.S.C. 3145, the Department of Labor has issued regulations at 29 CFR parts 1, 3, and 5 to implement the Davis-Bacon and related Acts. Regulations in 29 CFR 5.5 instruct agencies concerning application of the standard Davis-Bacon contract clauses set forth in that section. Federal agencies providing grants, cooperative agreements, and loans under the Recovery Act shall ensure that the standard Davis-Bacon contract clauses found in 29 CFR 5.5(a) are incorporated in any resultant covered contracts that are in excess of $2,000 for construction, alteration or repair (including painting and decorating).

(b) For additional guidance on the wage rate requirements of section 1606, contact your awarding agency. Recipients of grants, cooperative agreements and loans should direct their initial inquiries concerning the application of Davis-Bacon requirements to a particular federally assisted project to the Federal agency funding the project. The Secretary of Labor retains final coverage authority under Reorganization Plan Number 14.

33. DAVIS BACON ACT AND CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

If the Recipient determines at any time that any construction, alteration, or repair activity as defined by 29 CFR 5.2(j) (http://cfr.vlex.com/vid/5-2-definitions-19681309) will be performed during the course of the project, the Recipient shall notify the Contracting Officer prior to commencing such work and the following provisions shall apply. A modification to the award which incorporates the appropriate Davis-Bacon wage rate determination(s) will constitute the Contracting Officer's approval to proceed.

Definitions: For purposes of this provision, "Davis Bacon Act and Contract Work Hours and Safety Standards Act," the following definitions are applicable:

(1) "Award" means any grant, cooperative agreement or technology investment agreement made with Recovery Act funds by the Department of Energy (DOE) to a Recipient. Such Award must require compliance with the labor standards clauses and wage rate requirements of the Davis-Bacon Act (DBA) for work performed by all laborers and mechanics employed by Recipients (other than a unit of State or local government whose own employees perform the construction) Subrecipients, Contractors, and subcontractors.

(2) "Contractor" means an entity that enters into a Contract. For purposes of these clauses, Contractor shall include (as applicable) prime contractors, Recipients, Subrecipients, and Recipients' or Subrecipients' contractors, subcontractors, and lower-tier subcontractors. "Contractor" does not mean a unit of State or local government where construction is performed by its own employees."

(3) "Contract" means a contract executed by a Recipient, Subrecipient, prime contractor, or any tier subcontractor for construction, alteration, or repair. It may also mean (as applicable) (i) financial assistance instruments such as grants, cooperative agreements, technology investment agreements, and loans; and, (ii) Sub awards, contracts and subcontracts issued under financial assistance agreements. "Contract" does not mean a financial assistance instrument with a unit of State or local government where construction is performed by its own employees.

(4) "Contracting Officer" means the DOE official authorized to execute an Award on behalf of DOE and who is responsible for the business management and non-program aspects of the financial assistance process.

(5) "Recipient" means any entity other than an individual that receives an Award of Federal funds in the form of a grant, cooperative agreement, or technology investment agreement directly from the Federal Government and is financially accountable for the use of any DOE funds or property, and is legally responsible for carrying out the terms and conditions of the program and Award.

(6) “Subaward” means an award of financial assistance in the form of money, or property in lieu of money, made under an award by a Recipient to an eligible Subrecipient or by a Subrecipient to a lower-tier subrecipient. The term includes financial assistance when provided by any legal agreement, even if the agreement is called a contract, but does not include the Recipient’s procurement of goods and services to carry out the program nor does it include any form of assistance which is excluded from the definition of “Award” above.

(7) “Subrecipient” means a non-Federal entity that expends Federal funds received from a Recipient to carry out a Federal program, but does not include an individual that is a beneficiary of such a program.

(a) Davis Bacon Act

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and, without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, *provided* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The Contracting Officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the Contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *provided* that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The Department of Energy or the Recipient or Subrecipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the Contract, the Department of Energy, Recipient, or Subrecipient, may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in

providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii) (A) The Contractor shall submit weekly for each week in which any Contract work is performed a copy of all payrolls to the Department of Energy if the agency is a party to the Contract, but if the agency is not such a party, the Contractor will submit the payrolls to the Recipient or Subrecipient (as applicable), applicant, sponsor, or owner, as the case may be, for transmission to the Department of Energy. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime Contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Department of Energy if the agency is a party to the Contract, but if the agency is not such a party, the Contractor will submit them to the Recipient or Subrecipient (as applicable), applicant, sponsor, or owner, as the case may be, for transmission to the Department of Energy, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the Recipient or Subrecipient (as applicable), applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a “Statement of Compliance,” signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 3729 of title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Department of Energy or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees—

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State

Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the

Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this Contract.

(6) Contracts and Subcontracts. The Recipient, Subrecipient, the Recipient's, and Subrecipient's contractors and subcontractor shall insert in any Contracts the clauses contained herein in(a)(1) through (10) and such other clauses as the Department of Energy may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Recipient shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of the paragraphs in this clause.

(7) Contract termination: debarment. A breach of the Contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this Contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Recipient, Subrecipient, the Contractor (or any of its subcontractors), and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No Contractor or subcontractor contracting for any part of the Contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The Department of Energy or the Recipient or Subrecipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or

subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Contracts and Subcontracts. The Recipient, Subrecipient, and Recipient's and Subrecipient's contractor or subcontractor shall insert in any Contracts, the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Recipient shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(5) The Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the Contract for all laborers and mechanics, including guards and watchmen, working on the Contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. The records to be maintained under this paragraph shall be made available by the Contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Department of Energy and the Department of Labor, and the Contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

(c) Recipient Responsibilities for Davis Bacon Act

(1) On behalf of the Department of Energy (DOE), Recipient shall perform the following functions:

(i) Obtain, maintain, and monitor all Davis Bacon Act (DBA) certified payroll records submitted by the Subrecipients and Contractors at any tier under this Award;

(ii) Review all DBA certified payroll records for compliance with DBA requirements, including applicable DOL wage determinations;

(iii) Notify DOE of any non-compliance with DBA requirements by Subrecipients or Contractors at any tier, including any non-compliances identified as the result of reviews performed pursuant to paragraph (ii) above;

(iv) Address any Subrecipient and any Contractor DBA non-compliance issues; if DBA non-compliance issues cannot be resolved in a timely manner, forward complaints, summary of investigations and all relevant information to DOE;

(v) Provide DOE with detailed information regarding the resolution of any DBA non-compliance issues;

(vi) Perform services in support of DOE investigations of complaints filed regarding noncompliance by Subrecipients and Contractors with DBA requirements;

(vii) Perform audit services as necessary to ensure compliance by Subrecipients and Contractors with DBA requirements and as requested by the Contracting Officer; and

(viii) Provide copies of all records upon request by DOE or DOL in a timely manner.

(d) Rates of Wages

The minimum wages to be paid laborers and mechanics under this award involved in performance of work at the project site, as determined by the Secretary of Labor to be prevailing for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the pertinent locality, are found at http://www.wdol.gov/, by clicking on "Selecting DBA WDs". The Wage Determination Number(s) and General Decision Number(s) specific to this award are found below. These wage rates are minimum rates and are not intended to represent the actual wage rates that the Contractor may have to pay.

CONSTRUCTION TYPE	WAGE DETERMINATION NUMBER	GENERAL DECISION NUMBER
Building; Heavy	NM1	NM100001 04/09/2010 NM1

34. REOPENER TERM – PENDING INDIRECT RATES – FINANCIAL ASSISTANCE

(a) At the time the total budget cost for this award was established, agreement could not be reached on indirect rates. However, agreement was reached on a total estimated budget cost that includes a dollar amount for indirect costs and this amount is subject to adjustment in accordance with the provisions of this term and other administrative provisions of the award.

(b) By June 1, 2010 you shall submit an indirect rate proposal to the Contracting Officer and Cognizant Auditor for determination of a provisional billing rate.

(c) If the approved provisional billing rates result in amounts for indirect costs that are substantially lower the amount budgeted, you agree to commence negotiations to revise the budget and the total estimated cost for this award.

(d) Should you fail to submit the information in paragraph (b), or should there be no agreement as to the amount of the adjustment contemplated by this term, then the Contracting Officer may make a unilateral determination and modify the award accordingly.

35. CONTINGENCY

(a) Contingency Requirement. A minimum amount of Contingency is required for awards selected under Funding Opportunity Announcement DE-FOA-0000096. "Contingency" is defined in the Appendix as: "a provision in the Project Management Plan to mitigate cost and/or schedule risk." Contingency funds must be (a) liquid, (b) immediately available, and (c) unrestricted funds dedicated exclusively to the Project for the purpose of mitigating project performance baseline risk. Contingency funds may come from a variety of sources, as approved by the Contracting Officer on a case-by-case basis in accordance with the Appendix to these Terms and Conditions (Attachment 5).

(b) Minimum Amount of Contingency. Initial Contingency funds shall be not less than 25 percent of the Total Project Cost that begins with Budget Period 2, as more specifically described in Section B(2) of the Appendix to these Special Terms and Conditions (Attachment 5).

(c) Contingency Not Counted Toward Cost Share or DOE Reimbursement. Contingency is in addition to the Total Project Cost and cannot count toward cost share or result in reimbursement by DOE above the share approved in the award.

(d) Appendix. All of the terms and conditions set forth in this provision shall be further subject to the requirements and clarifications of Attachment 5.

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U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: Sapphire Energy, Inc. **STATE:** CA

PROJECT TITLE : Integrated Algal Biorefinery (IABR) BP1

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-PS36-09G099038	EE0002884	GFO-10-365	EE2884

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

A9 Information gathering (including, but not limited to, literature surveys, inventories, audits), data analysis (including computer modeling), document preparation (such as conceptual design or feasibility studies, analytical energy supply and demand studies), and dissemination (including, but not limited to, document mailings, publication, and distribution; and classroom training and informational programs), but not including site characterization or environmental monitoring.

B3.1 Onsite and offsite site characterization and environmental monitoring, including siting, construction (or modification), operation, and dismantlement or closing (abandonment) of characterization and monitoring devices and siting, construction, and associated operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis. Activities covered include, but are not limited to, site characterization and environmental monitoring under CERCLA and RCRA. Specific activities include, but are not limited to:

B3.11 Outdoor tests and experiments for the development, quality assurance, or reliability of materials and equipment (including, but not limited to, weapon system components), under controlled conditions that would not involve source, special nuclear, or byproduct materials. Covered activities may include, but are not limited to, burn tests (such as tests of electric cable fire resistance or the combustion characteristics of fuels), impact tests (such as pneumatic ejector tests using earthen embankments or concrete slabs designated and routinely used for that purpose), or drop, puncture, water-immersion, or thermal tests

B3.6 Siting, construction (or modification), operation, and decommissioning of facilities for indoor bench-scale research projects and conventional laboratory operations (for example, preparation of chemical standards and sample analysis); small-scale research and development projects; and small-scale pilot projects (generally less than two years) conducted to verify a concept before demonstration actions. Construction (or modification) will be within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible).

Rational for determination:

DOE is proposing to provide federal funding to Sapphire Energy to design and build an Integrated Algal Biorefinery (IABR) in Columbus, NM. This project has been divided into 2 budget periods (BP) separated by a DOE go/no go decision point. A NEPA decision is required for both BP1 and BP2. This NEPA determination applies to BP1 only.

BP1 consists of 6 tasks: a) feasibility study; b) conceptual analysis; c) process design; d) front end engineering design; e) research and development; and f) project management and reporting.

The research and development task consists of geotechnical and hydrological studies to be completed at the proposed project site for permitting purposes. The geotechnical and hydrology studies can be characterized as both site characterization and outdoor tests and experiments for reliability of materials. Both CX B3.1 and B3.11 apply to the geotechnical and hydrological studies with application of the required mitigation measures listed below.

The USDA completed an Environmental Assessment and issued a Finding of No Significant Impact (FONSI) for the project proposed by Sapphire. During the preparation of the EA, USDA consulted appropriate agencies and organizations as required by NEPA and other requirements. Of note, the State Historical Preservation Officer concurred with the USDA's "Determination of No Affect" and the NM State Soil Scientist determined that the site contains no prime, unique, statewide or locally designated farmland. The USDA FONSI included 4 mitigative measures. Mitigative measures 1 and 2 listed in the FONSI are required to be performed priot to completing the ground disturbing activities defined in BP1. Per mitigative measure 3, USACE has confirmed that there are no jurisdictional wetlands or waterways located on the property.

CX A9, B3.6, B3.1 and B3.11 apply to Budget Period 1, with the required mitigation applied.

NEPA PROVISION

DOE has made a conditional NEPA determination for this award, and funding for certain tasks under this award is contingent upon the final NEPA determination.

Insert the following language in t vard:

You are restricted from taking any action using federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE/NNSA providing either a NEPA clearance or a final NEPA decision regarding the project.

Prohibited actions include:
BP1 ground disturbing activities are prohibited until mitigative measures 1 and 2 from the USDA FONSI are met.

Also, final design, capital equipment purchase, site preparation, construction and operation activities are prohibited at this time.

This restriction does not preclude you from:
Budget Period 1 activities.
If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

Insert the following language in the award:

You are required to:
1. Minimize the likelihood of adverse impacts to birds protected under the Migratory Bird Treaty Act by completing nesting bird surveys in areas to be disturbed during BP1. If nesting birds occupy the area to be disturbed during BP1, all ground disturbing activities should be avoided until nesting is complete.

2. Coordinate with USFWS and NMDFG in order to minimize potential impacts to any burrowing owls located on the site, if present, as outlined in the "Guidelines and Recommendations for Burrowing Owl Surveys and Mitigation" (July 2007)

Results of the nesting bird and burrowing owl surveys must be submitted to DOE for review and approval prior to DOE or cost share funds being applied to any ground disturbing activities.

Note to Specialist :

None Given.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Kristin Kerwin Date: 4/28/2010
NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

☐ Field Office Manager review required

NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____
Field Office Manager

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER

NEPA REVIEW AND RECOMMENDATIONS
(To Be Completed By DOE Project Officer)

PART I. PROJECT INFORMATION

Project Title: Integrated Algal Biorefinery (IABR) BP1 **State:** CA

Recipient: Sapphire Energy, Inc.

Funding Opportunity Announcement Number	Procurement Instrument Number	CID Number
DE-PS36-09G099038	EE0002884	EE2884

1. Is this an ongoing project? Yes: ☐ No: ☑ If no, skip to part II.

Original NEPA Determination Category Original NEPA Control Number

2. Has there been a change in the original scope, environmental conditions, and/or determination? Yes: ☐ No: ☑
If yes, please describe the nature of the change.
N/A

PART II. RECOMMENDED CATEGORY OF EVIRONMENTAL REVIEW

Please provide answers to the following questions and indicate your recommended category of environmental review. If you need assistance, please contact Steve Blazek (Contact information listed below)

1. Please describe the intended use of DOE and cost share funding associated with this award.
Sapphire Energy is in the planning stages of building an Integrated Algal Biorefinery (IABR) in Columbus, NM that will utilize 300 acres of open algal ponds to produce jet fuel and diesel from algal biomass. DOE and cost share funding that will be used during Budget Period 1 will cover a variety of activities that include administrative and design tasks, research and development, as well as pilot-scale activities. The administrative tasks mainly encompass work on the engineering designs for the various operations at the IABR. Administrative tasks will also include any activities that are necessary to complete the DOE NEPA process and to complete the various state and Federal permitting actions (including the groundwater discharge permit, follow owl surveys, ect). In addition, a fence surrounding the Columbus, NM property will be built to prevent public and livestock access to the facilities.

Sapphire Energy is also planning to perform geotechnical and hydrological studies during Budget Period 1 for permitting purposes. They will

Redacted Exemption 4

as a viable pond liner. Specific details regarding the geotechnical site work include:
- 1 Ground water test well to 450'
- 200 Soil push tests to 5-10' across the project site.
- Soil test pits to 5' for soil sampling in several locations
- Cone penetration tests to 30-100' in areas where buildings are planned.
- 6 exploratory borings to 50-100' in areas where buildings are planned with backfilling when complete.

Specific details regarding the test ponds include:
- 5 ponds: 15'x30' at 5' deep.

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Some research and development will also be pursued toward the end of Budget Period 1 by Sapphire's R&D partners, New Mexico State University and Sandia National Laboratory. During BP1, NMSU will consult with Sapphire on the pond liner research (test beds). SNL will provide pond modeling including flow characterization and other parameters based on the actual test data. Both will consult with Sapphire on optimizing engineering and design of the beds leading to final design in Budget Period 2. The modeling will take place at SNL; however, the consultation work on the pond liner research will take place at Sapphire's facilities.

2. Please list any applicable **existing** documentation (i.e. programmatic EAs, technical studies, state level environmental reviews). For each, please list the type of document, and its title, document number (if applicable), and date of publication.
An Environmental Assessment of this project has already been completed by the USDA Rural Development Energy Division in order to obtain a loan guarantee. Thus, the scope of work that was reviewed by the USDA is identical to the scope of work being funded by DOE for this project, including all BP1 activities noted above. USDA issued a Finding of No-Significant Impact for the IABR project and this has been provided to DOE for review and/or adaptation.

3. Concerns or Issues
Please note that the EF-1 includes the purchase of long lead capital equipment. Sapphire has moved this task to as early in BP2 as possible. The geotechnical work is time critical and one of the first actions that must take place immediately for the project to maintain its schedule. As the proposed technology includes open ponds, much of the engineering and design as

well as the permitting is based o' results of the geotechnical reviews and stuc The geotechnical work is also described in the USDA EA.

4. Is there enough information available to make a final NEPA determination for the entire award at this time? Yes: ☐ No: ☑
If no, please describe what additional information will be needed prior to making a final NEPA determination.
The USDA EA will need to be reviewed, supplemented if necessary, and adopted by DOE in order for the final NEPA determination to be made on the entire project. This process is underway.

5. CX, EA, EIS Category
Appendix and Number

B3.1 Onsite and offsite site characterization and environmental monitoring, including siting, construction (or modification), operation, and dismantlement or closing (abandonment) of characterization and monitoring devices and siting, construction, and associated operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis. Activities covered include, but are not limited to, site characterization and environmental monitoring under CERCLA and RCRA. Specific activities include, but are not limited to:

B3.6 Siting, construction (or modification), operation, and decommissioning of facilities for indoor bench-scale research projects and conventional laboratory operations (for example, preparation of chemical standards and sample analysis); small-scale research and development projects; and small-scale pilot projects (generally less than two years) conducted to verify a concept before demonstration actions. Construction (or modification) will be within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible).

PART III. CONTACT INFORMATION

DOE Project Officer: Sterner, Christy **Date:** 4/15/2010 **EERE Office:** Golden Field Office

Email: christy.sterner@go.doe.gov **Phone:** 303-275-4720 **Fax:** 303-275-4753

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U.S. DEPARTMENT OF ENERGY

EERE PROJECT MANAGEMENT CENTER

ENVIRONMENTAL CHECKLIST

(To Be Completed by Potential Recipient)

PART I: General Information

DOE Project Officer: Christy Sterner **Date:** 1/29/2010

Project Title: Integrated Algal Biorefinery (IABR) **ST:** CA

Organization Name: Sapphire Energy, Inc.

Solicitation Number: DE-PS36-09G099038 Award No: EE0002884

1. Please describe the intended use of DOE funding in your proposed project. For example, would the funding be applied to the entire project or only support a phase of the project? Describe the activity as specifically as possible, i.e. planning, feasibility study, design, data analysis, education or outreach activities, construction, capital purchase and/or equipment installation or modification. If the project involves construction, also describe the operation of the completed facility/equipment.

Planned expenditure of DOE funding through the period January 1, 2010 through August 31, 2010 (Budget Period No. 1) will include payment for the following goods and services:

1. Permitting assistance to expedite the various state and Federal permitting actions discussed in Part II, section 3 of this document:
2. Redacted Exemption 4

3. Specification and procurement of capital equipment as required as of 3rd quarter, 2010
a. fencing to limit public and stock access to liner test facilities;
4. Preliminary engineering scaleup studies as required based on data collected from operations of the pilot test facility in Las Cruces, NM;
5. Ongoing environmental studies as necessary to further define use of the site by burrowing owls and other special status species;

6. All required designs, plans, estimations and engineering efforts required to complete the FEL-3 project design phase. Completion of FEL-3 design will permit a detailed project stage gate evaluation and is the final step prior to implementation of "For Construction" designs and plans.

2. Does any part of your project require review and/or permitting by any other federal, state, regional, local, environmental, or regulatory agency? ☑ Yes ☐ No

3. Has any review (e.g., NEPA documentation, permits, agency consultations) been completed?

☑ Yes ☐ No If yes, is a finding or report available and how can a copy be obtained?

An Environmental Assessment (EA) of the IABR project was completed by the United States Department of Agriculture (USDA), Rural Development Energy Division to support a USDA Biorefinery Assistance Loan Guarantee application submitted by Sapphire. A Finding of No-Significant Impact (FONSI) was issued by the USDA for the IABR project on November 23, 2009. The FONSI has been provided to the DOE by the USDA. Additional documentation of consultation with various agencies can be obtained by contacting Sapphire or the USDA, Rural Development.

Please see attached documents for additional information.

4. Is the proposed project part of a larger scope of work? ☐ Yes ☑ No If yes, please describe.

The proposed project work to be conducted from January 1, 2010 through August 31, 2010 (Budget Period No. 1) is part of the larger scope of work which includes construction and operation of the IABR site. Work to be completed during Budget Period No. 1 is instrumental to development of data necessary to allow timely permitting and ultimately, construction of the IABR project. After approximately 3 years of operation of the IABR, results of the pilot tests will be evaluated by Sapphire to assess the feasibility of the process and the financial viability of the project. At that point, a decision will be made on developing a commercial-scale facility. In concept, the commercial-scale facility would include development of a pond system that would cover approximately 25,500 acres, resulting in oil production of approximately 10,000 barrels per day.

The location of such a commercial-scale facility is currently unknown but, should the development proceed, the location will be determined following evaluation of the feasibility of the process implemented at the IABR. Some of the more important criteria to be evaluated in siting of a commercial-scale facility include

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but it is premature to evaluate potential impacts associated with a commercial-scale facility until the technology has been proven at a pilot-scale and the feasibility of the process has been proven.

The degree of governmental review and analysis of any commercial-scale facility developed will depend largely on the location of the site with respect to public land. The types of permits and impact analyses to be completed to support a commercial-scale facility are expected to be similar to that completed for the IABR, although the scale of the project may require a greater depth and breadth of analysis. In addition, it is probable that such a facility would have connected actions associated with it that would require further regulatory scrutiny, such as construction of pipeline and utility corridors and possible

Do you anticipate requesting additional federal funding for subsequent phases of this project?

☐ Yes ☑ No If yes, please describe.

5. Does the scope of your project **only** involve one or more of the following:

- ☐ Information gathering such as literature surveys, inventories, audits,
- ☐ Data analysis including computer modeling,
- ☐ Document preparation such as design, feasibility studies, analytical energy supply and demand studies, or
- ☐ Information dissemination, including document mailings, publication, distribution, training, conferences, and informational programs.

Preparer:	Phone:	Email:
Lisa Doyle	949-202-4705	lisa.doyle@sapphireenergy.com
Business Contact:	Phone:	Email:
Jaime Moreno	949-202-4700	jaime.moreno@sapphireenergy.com

PART II: Environmental Considerations

Section A Conditions or special areas are present, required, or could be affected by your project:

1. Clearing or Excavation

Yes, 300 acres of algal ponds, Redacted Exemption 4 , NMED discharge permit required for leakage from ponds.

3. New or Modified Federal/State Permits And/or Requests for Exemptions

See table 1, Supplemental Information
WATER RIGHTS
Existing Well Repair Permit
Issuing Agency: Office of the State Engineer
Requirement: Applies to any repair performed on existing well
Public Notice Req: None
Status: Application anticipated at time of facility construction: Expect 5-day turn around time by agency
New Well Permit
Issuing Agency: Office of the State Engineer
Requirement: Applies to installation of any new commercial well
Public Notice Req: Yes: 60 - 90 day public notice period
Status: If needed, new well application will be submitted. Expected turn around time by agency - 90 days
Change in Water Right Authorization
Issuing Agency: Office of the State Engineer
Requirement: Applies to any change in the type of use, place of use, or point of diversion for water rights purchased
Public Notice Req: Yes: 10 days
Status:

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WATER QUALITY
Storm Water Discharge Permit (includes Construction General Permit [CGP], General Permit [GP], and Storm Water Pollution Prevention Plan [SWPPP])
Issuing Agency: US EPA Region 6 / Clean Water Act (CWA) §402(p) Part 122.26
Requirement: Applies to construction activities which disturb more than one acre
Public Notice Req: None
Status:

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Groundwater Discharge Permit
Issuing Agency: New Mexico Environmental Department (NMED) / New Mexico Water Quality Act (WQA) NMAC 20.6.2.3103 and NMAC 20.6.2.3104.
Requirement: A discharge permit will be required for expected seepage from the production ponds and the evaporation pond(s) at the IABR.
Public Notice Req: Yes: Public notice is required (NMAC § 20.6.2.3108).
Status:

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Septic System Permit
Issuing Agency: New Mexico Environmental Department (NMED) - District III Office in Las Cruces / NMAC § 20.7.3.
Requirement: A liquid waste (septic tank) permit must be obtained.
Public Notice Req: None
Status: Permit will be obtained 30 days prior to construction of IABR.

AIR QUALITY
Air Quality Permit
Issuing Agency: New Mexico Environmental Department - Air Quality Bureau / NM. Stat. Ann. §§ 74-2-1
Requirement: Operation of certain equipment presently planned for use at the IABR facility will require the facility to obtain an air quality permit.
Public Notice Req: 30 days after NSR; 30 days after department' analysis.
Status:

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11. Prime, Unique or Important Farmland

No, NRCS consultation complete.

12. Archeological/Cultural Resources

No, SHPO consultation complete.

HISTORIC PRESERVATION
Eligibility for Listing on the National Register of Historic Places (National Register)
Issuing Agency: New Mexico State Historic Preservation Office (SHPO) / Section 106 of the National Historic Preservation Act of 1966 as amended (PL 89-665) the Archaeological Resource Protection Act of 1979 (PL 96-95), and Executive Order 11593.
Requirement: The "lead agency" is the federal or state entity responsible for consulting with the SHPO to make sure that appropriate cultural resource laws and regulations are followed for the project.
Public Notice Req: Yes, if NHPA Section 106 Consultation is required.
Status: A Cultural Resource Survey was completed at the proposed IABR facility by a qualified New Mexico-certified archaeological firm. Impacts to cultural or historical resources are not anticipated with the project. On August 31, 2009, the SHPO concurred that the project will have no effect on cultural or historic resources. SHPO notified USDA that Section 106 consultation with the tribes was required. These tribes were notified and no comments were received within 30 day comment period.

13. Threatened/Endangered

No, USFWS and NM Game and Fish consultation complete.

SPECIAL STATUS SPECIES
New Mexico Protect Wildlife Species, US Fish & Wildlife Service Threatened and Endangered Species
Issuing Agency: New Mexico Game and Fish Department / NM. Wildlife Conservation Act (WCA) NMAC § 17.2.37 through 46; US Fish and Wildlife Service / Endangered Species Act (ESA) (7 USC §136 and 16 USC §1531 et. seq.)
Requirement: Applicant will be required to submit a "Request for Consultation" to the NM Game and Fish Department and USFWS.
Public Notice Req: None
Status:

Redacted Exemption 4

14. Other Protected Species

Yes, Burrowing Owls potentially present on site. Additional surveying and consultation to be completed.

Migratory Bird Treaty Act (MBTA) / Bald and Golden Eagle Protection Act (BGEPA)
Issuing Agency: US Fish and Wildlife Service / Migratory Bird Treaty Act / Bald and Golden Eagle Protection Act
Requirement: Complete surveys for these species and consult with the USFWS.
Public Notice Req: None: No formal permit required.
Status:

Redacted Exemption 4

18. Wetlands

No, Surveys and consultations complete. Jurisdictional determination complete.

404 (Wetlands) Permit
Issuing Agency: U.S. Army Corps of Engineers El Paso District. The State of New Mexico's New Mexico Environmental Department (NMED) reviews and certifies all EPA permits issued in the state per CWA Section 401 / Clean Water Act (CWA) §404.
Requirement: Required if wetlands are present and impacted
Public Notice Req: Possible. Likely a month.
Status:

Redacted Exemption 4

21. Noise

Yes, during construction; minimal impact.

2. Dredge and/or Fill.

No

4. Pre-Existing Contamination

No

No

6. Criteria Pollutants

No

7. Non-Attainment Areas

No

8. Class I Air Quality Control Region

No

9. Navigable Air Space

No

10. Areas with Special Designation

No

15. Floodplains

No

16. Special Sources of Groundwater

No

17. Underground Extraction/Injection

No

19. Coastal Zones

No

20. Public Issues or Concerns

No

22. Depletion of a Non-Renewable Resource

No

23. Aesthetics

No

Section B. Would your project use, disturb, or produce any chemicals or biological substances? (i.e., pesticides, industrial process, fuels, lubricants, bacteria)

2. Import, Manufacture, or Processing of Toxic Substances

☑ Permit Required Quantity: TBD Permit Type: TBD

Specific nature of use:

CO2 56 tons per day
Propane Quantity to be determined
Permit-SPCC Plans
Spill Prevention, Control, and Countermeasure (SPCC) Plan
Issuing Agency: US EPA Region 6 / 40 CFR § 112.7
Requirement: Facilities that could reasonably be expected to discharge oil in quantities that may be harmful into navigable waters of the United States and adjoining shorelines to develop and implement SPCC Plans.
Public Notice Req: None
Status: SPCC Plan will be required for IABR after facility construction.

3. Chemical Storage, Use, and Disposal

☐ Permit Required Quantity: Permit Type:

Specific nature of use:

Redacted Exemption 4

8. Hazardous Waste

☑ Permit Required Quantity: Permit Type:

Specific nature of use:

Redacted Exemption 4

Hazardous Waste Permit
Issuing Agency: New Mexico Environmen. partment / US Department of Agriculture / New Mexico's H ous Waste Act (HWA) and associated regulation (NMAC § 20.4.1) - based on US EPA Resource Conservation and Recovery Act (RCRA) definitions and requirements.
Requirement: Applies if any hazardous solid waste is generated at the Site or if solid waste is disposed at the Site.
Public Notice Req: None
Status:

Redacted Exemption 4

10. Biological Materials.

☐ Permit Required Quantity: Permit Type:

Specific nature of use:

Yes, Micro algae as needed. Strains of micro algae used, but Sapphire's strains do not contain recombinant DNA and therefore are not classified as genetic engineering.

No permit required.

Section C. Would your project require or produce any radiological materials?

PMC 121.1
(07/2008)

U.S. DEPARTMENT OF ENERGY
PROJECT MANAGEMENT CENTER

PRE-AWARD INFORMATION SHEET
ALL INFORMATION REQUESTED ON THIS FORM MUST BE PROVIDED

Awardee Name:	Sapphire Energy, Inc.
Award Number:	DE-EE0002884
Awardee Business Officer:	David Buttaro
Awardee Project Director:	Jaime Moreno

Employer/Taxpayer Identification Number (EIN/TIN):	Redacted Exemption 3
Data Universal Numbering System (DUNS):	798830688

For assistance in obtaining a DUNS Number, call Dunn & Bradstreet at 1-800-333-0505.
The Applicant should be prepared to provide the following information to Dunn & Bradstreet:
(1) Company name
(2) Company address
(3) Company telephone number
(4) Line of business
(5) Chief executive officer/key manager
(6) Date the company was started
(7) Number of people employed by the company
(8) Company affiliation

Note: Awardee Name, EIN/TIN and DUNS MUST coincide with the Awardee's information recorded in the Central Contract Registry (CCR).

A. TYPE OF BUSINESS - the Awardee is a:

- ☒ For-Profit Organization (Other than Small Business)
  - ☒ Corporation
  - ☐ Partnership
  - ☐ Sole Proprietorship
- ☐ Government
  - ☐ Local Government
  - ☐ State Government
  - ☐ Indian Tribal Government
- ☐ Individual
- ☐ Institution of Higher Education
- ☐ Other NonProfit Organization
- ☐ Small Business
- ☐ Other (specify):

If NonProfit, select one below:

☐ A university or other institution of higher education or an organization of the type described in Section 501(c)(3) of the Internal Revenue Code of 1954 (26 USC 501(c)) and exempt from taxation under Section 501(a) of the Internal Revenue Code (26 USC 501(a)); or

☐ An organization of the type described in Section 501(c)(4) of the Internal Revenue Code of 1954 (26 USC 501(c)) and exempt from taxation under Section 501(a) of the Internal Revenue Code (26 USC 501(a)); or

☐ An organization of the type described in Section 501(c)(6) of the Internal Revenue Code of 1954 (26 USC 501(c)) and exempt from taxation under Section 501(a) of the Internal Revenue Code (26 USC 501(a)); or

☐ A nonprofit scientific or educational organization qualified under a State nonprofit organization statute. (Please identify the statute.); or

☐ Other (specify type):

Is the Applicant a member of the Federal Demonstration Partnership (FDP)? ☐ Yes ☒ No
A listing of FDP members is available at http://www.thefdp.org/FDP_Members.html.

B. INTELLECTUAL PROPERTY

1. WAIVER OF DOE PATENT RIGHTS

This section applies only to large businesses and nonprofits other than 501(c)(3) organizations. All others should leave this subsection blank and proceed to the "Rights in Application Data" subsection that follows. Large businesses and nonprofits other than 501(c)(3) organizations have the right to request, in advance or within 30 days after execution of an award, in accordance with applicable statutes and DOE Patent Waiver Regulation (10 CFR 784), a waiver of all or any part of the rights of the United States in Subject Inventions. Accordingly, please check all that apply:

☒ I intend to request an advance waiver in accordance with 10 CFR 784.
☐ I intend to request an advance waiver on behalf of one or more subrecipients/subcontractors.
☐ I have at least one subrecipient/subcontractor that will request a waiver on its own behalf.
☐ I do not intend to request an advance waiver.

2. RIGHTS IN APPLICATION DATA

For an award based on an application/proposal, the Government will obtain unlimited rights in the technical data contained in the application/proposal, unless the Awardee marks those portions of the technical information which it asserts as "proprietary data" or specifies those portions of such technical data which are not directly related to or will not be utilized in the work to be funded under this award.

Accordingly, please indicate:

☐ No restrictions on Government rights in technical data contained in the application/proposal; or

☒ The application/proposal contains the following identified technical data that is proprietary, or is not directly related to, or will not be utilized in the work to be funded under this award.

Please list specific page numbers, table numbers, etc., and the dated version of the application/proposal to which you refer:
Project Narrative pgs.1-15; Project Management Plan pgs. 1-28; Business & Commercialization Plan pgs. 1-20; Project Execution Plan pgs. 1-60; Environmental Questionnaire pgs. 1-15; Intellectual Property Statement pgs. 1-5.

3. IDENTIFICATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE

Below, please identify any Limited Rights Data or Restricted Computer Software you plan to use to carry out your work under the award. Limited Rights Data means data (other than computer software) developed at private expense that embody trade secrets or are commercial or financial, and confidential or privileged. Restricted Computer Software means computer software developed at private expense and that is a trade secret, is commercial or financial, and confidential or privileged, or is published, copyrighted computer software, to include modifications of the computer software.

Please note that these data do not include data that you will produce under this award. Data that is first produced under this award is treated separately under the data rights clause of this award. This section covers only those data that you bring into this award that were privately funded.

If you plan to use Limited Rights Data or Restricted Computer Software under the award, please describe it in a few sentences or bullets, with sufficient detail that the DOE Project Officer can determine whether DOE will need to have any of it delivered, for example, to validate your results or the data produced under the award. You are not required to list issued patents or published patent applications. You do need to list unpublished patent applications (by title and brief description) and trade secret processes (by non-proprietary title with brief, non-proprietary description). If you have questions regarding the completion of this section, please contact the Contract Specialist handling your award.

Based on the above, please review the requirements in the technical scope of work for this award and indicate, to the best of your knowledge:

☐ No Limited Rights Data will be utilized in the performance of this award.

☒ Limited Rights Data as follows will be utilized in the performance of this award.

Use this block to provide additional information or provide an attachment:
Biological, chemical, process and techno economic data that serve as decision information for IABR design, construction and operation

Based on the above, please review the requirements in the technical scope of work for this award and indicate, to the best of your knowledge:

☒ Awardee Restricted Computer Software will NOT be utilized in the performance of this award.

☐ Awardee Restricted Computer Software as follows will be utilized in the performance of this award.

Use this block to provide additional information or provide an attachment:

C. PROJECT PERFORMANCE SITE and CONGRESSIONAL DISTRICT

List the address and congressional district for the primary site where the work will be performed:

Street Address:	
City:	Columbus
State:	New Mexico
Zip:	88029
Congressional District:	2

If a portion of the work will be performed at any other site(s), identify those site(s) below, and indicate what portion of the effort will be performed at this/these site(s):

Street Address:	27101 Puerta Real, Suite 280
City:	Mission Viejo
State:	CA
Zip:	92691
Congressional District:	42

Briefly describe portion of effort for this Site:	Design & Engineering; Project Management

D. INVOICING AND PAYMENTS

1. Has the Awardee received any prior DOE awards administered by the Golden Field Office (GO)?

   ☐ Yes

   If yes, please list the most recent award number: _____

   ☒ No

2. Is the Awardee currently enrolled with the U.S. Department of Treasury / ASAP system (Automated Standard Application for Payment System) under the DOE / Golden Field Office (GO) Agency Locator Code (ALC) and Region Code (#8900-0001-04)?

   ☐ Yes

   Enter Awardee Seven-digit ASAP ID Number: _____

   ☒ No

3. Please provide the following contact information for ASAP and/or Payments:

   IMPORTANT: If not currently enrolled in the ASAP system under GO's ALC and Region Code, the person identified below will be contacted by the U.S. Department of Treasury with further instruction on completing the ASAP enrollment process.

   ASAP / Payments Contact Person: David Buttaro

   Phone No.: 858-768-4704 Extension: _____ E-mail: David.buttaro@sapphireenergy.com

4. Indicate preferred payment method below: (NOTE: this section is reserved for universities, hospitals, other non-profit organizations and state and local governments that are authorized Advance Payment Procedures, unless a specific need is supported. All other entities desiring advance payment should discuss with the DOE Award Administrator.)

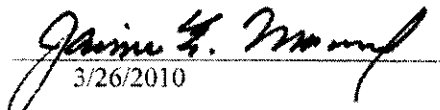
   ☐ Payment by Advance is preferred. (SF 272 reporting will be required.)
   ☒ Payment by Reimbursement is preferred. (SF 272 reporting will not be required.)

5. Indicate the name, phone number, and email address of the Designated Responsible Employee for complying with national policies prohibiting discrimination (see 10 CFR 1040.5 and the Certifications and Assurances found at http://management.energy.gov/documents/CERTSASSUR.doc).

Cynthia J. Warner	(858) 768-4713
Name	Telephone Number
President	**cj.warner@sapphireenergy.com**
Title	Email Address

REPRESENTATION/CERTIFICATION

I represent by my signature below that all the information provided by this form is accurate.

Name:	Jaime E. Moreno
Title:	Vice President of Projects
Signature of Authorized Company Official:	
Date:	3/26/2010

PMC 120.1
(2/08)

U.S. DEPARTMENT OF ENERGY
GOLDEN FIELD OFFICE

FINANCIAL ASSISTANCE COMBINED COST/TECHNICAL EVALUATION AND NEGOTIATION MEMORANDUM

SECTION I - GENERAL INFORMATION

This technical evaluation/negotiation memorandum will be prepared jointly by the assigned DOE/Golden OCPM AND OAFA personnel, to document the specific action being evaluated and supported. Each office is responsible for certain sections of this document. The assigned OCPM and OAFA personnel responsible for the action will both sign this document upon its completion, demonstrating their agreement on its contents.

1. Recipient: Sapphire Energy, Inc.

2. Grant/Cooperative Agreement No.: DE-EE0002884 Modification No. 002
   Requisition No: 10EE003955
   Project Title: Recover Act - Sapphire Integrated Algal Biofinery (IABR)

3. Type of Action: ☐ New Award ☐ Renewal ☐ Continuation ☒ Revision

Description of this Action: (NOTE: Indicate what is addressed by this Action only):

The purpose of this action is to lift the conditions on Budget Period 1 for the Sapphire Energy, Inc. (DE-EE0002884) project titled, "Recovery Act - Sapphire Integrated Algal Biofinery (IABR)." Specifically, this action approves the statement of project objectives and budget associated with budget period 1 activities for the prime recipient, subrecipient, vendors, and FFRDC; it also changes the primary contact/PI from Kulinda Davis to Jaime Moreno; Kulinda Davis no longer works for Sapphire. The total approved budget for budget period 1 is $ Ex. 4 The total DOE share is $6,778,098 which includes $275,000 already obligated to the FFRDC (Sandia National Laboratories), and the total cost share Redacted Exemption 4

4. Award type, as determined at Procurement Strategy Meeting (for new awards): ☐ Grant ☒ Cooperative Agreement

If Cooperative Agreement, provide the specifics of the Substantial Involvement. (Note: This language will be used in the Substantial Involvement provision of the award.):

1. Government Insight

   In order to adequately monitor project progress and provide technical direction and/or redirection to the Recipient, DOE must be provided an adequate level of insight into various Recipient activities. Government Insight activities by DOE include attendance at Recipient meetings, reviews and tests, as well as access for DOE's consultants to perform independent evaluations of Recipient's plans and processes. Recipient shall notify the DOE Project Officer of meetings, reviews, and tests in sufficient time to permit DOE participation, and provide all appropriate documentation for DOE review.

2. Specific activities to be conducted by DOE:

   a. Risk Evaluation – DOE will review the Recipient's initial Risk Mitigation Plan (RMP) for quality and completeness. DOE will also monitor updates to the RMP and actions taken by the Recipient during the performance of its award to mitigate risks and improve the probability of successful execution of the integrated Biorefinery project. At DOE's discretion, additional independent risk analyses of the project by DOE consultants may be requested.

   b. Independent Engineering Assessments – DOE will engage a private, independent engineering (IE) firm to assist in assessing the progress of the project and provide timely and accurate reports to DOE. The Recipient will ensure that the IE has access to any and all relevant documentation sufficient to allow the IE to provide independent evaluations to DOE on the progress of the project. Such documentation includes but

is not limited to the following:

- Drawings and specifications
- Construction and Execution plans
- Resource loaded schedules
- Design functions and requirements for the site final design review
- Risk management plans
- Value management and engineering studies and/or plans
- Acquisition strategies
- Project execution plans
- Project controls including earned value management systems
- Qualifications of the integrated project team.
- Financial strategy for funding the construction project
- Updated marketing and business plan
- Invoices submitted to DOE

DOE will evaluate the quality and completeness of information and documentation provided by the Recipient to DOE and its consultants in order to allow DOE to provide technical direction and/or redirection to the Recipient about how best to achieve the purposes of the award. Consultants to DOE may not provide technical direction and/or redirection to the Recipient.

5. New/Revised Project Period for this Award: From: 12/29/2009 To: 9/30/2014
   New/Revised Budget Period 1 for this Award: From: 12/29/2009 To: 9/30/2010
   New/Revised Budget Period 2 for this Award: From: 10/01/2010 To: 09/30/2014

6. Compliance Assessment (skip if new award):
   a. Deliverables
   The Recipient is current in submitting required reports: ☐ Yes ☐ No
   If no, identify the delinquent report(s), indicate what action(s) have been taken to remedy the situation, and identify what further action(s) are necessary, if any:

N/A

   b. Financial
   The Recipient is current in meeting the cost share requirement: ☐ Yes ☐ No
   If no, indicate what action(s) have been taken to remedy the situation and validate why this new action should proceed:

N/A

7. Check the applicable box for Funding Appropriation: ☒ Energy and Water ☐ Other _____
8. Check the applicable box for Statutory Authority:

☒ 109-58, Energy Policy Act 2005
☐ 110-140, Energy Independence and Security Act 2007
☒ 111-5, Recovery Act 2009
☐ Other: _____

9. Per 10 CFR 600, the preferred payment method for State/Local Governments, Institutions of Higher Education, Hospitals, or Other Non-Profit Organizations is **Advance**. The preferred Payment Method for For-Profit organizations is **Reimbursement**. If the preferred payment method is not planned for a new award, provide an explanation below. Also explain below if the payment method for the award is being changed by this action.

The recipient is receiving ARRA funds and will continue to be on the ACH payment method to monitor their funds to ensure costs outside of Budget Period 1 are not charged to the award.

10. Is the proposed Recipient on the debarred or suspended list? Yes ☐ No ☒
    Are any of the proposed subrecipients/subcontractors on the debarred or suspended list? Yes ☐ No ☒
    Is the Project Director on the debarred or suspended list? Yes ☐ No ☒
    If yes for either response above, award cannot be made without obtaining a waiver. See attached waiver.
    The review was conducted on the Internet on 04/16/2010 (Include Printout in permanent STRIPES file)
    (Date)
    A risk determination has been completed on the PMC Form 460.2 Yes ☐ N/A ☒

11. Negotiation:

	Government Negotiator(s)		Recipient Negotiator(s)	
	Name	Organization	Name	Position
1.	Molly Hames	Project Specialist	Jaime Moreno	Vice President
2.	Christy Sterner	Project Officer	Dave Marsh	Engineer
3.	Christine English	Navarro Project Engineer		

SECTION II – NEGOTIATION SUMMARY

1. Please record any significant application or budget submissions that resulted in a revised budget in the Negotiation History Table below (including SF424A, budget justifications, e-mails, etc.):

Application/Budget Submission	Reference Document(s)	Date of Submission	Summary of Change
Original	SOPO, SF424A, PMC 123.1	Jun-09	Original application
Revision #1	SOPO, SF424A, PMC 123.1	4/8/2010	SOPO and budget modified to reflect Budget Period 1 rather than entire project
Final	SOPO, SF424A, PMC 123.1	4/14/2010	Formatting changes to SOPO, budget modified with more information than previous submittal

2. Complete Budget Table below (only include the original budget and final negotiated costs – the Percent of Total Negotiated Budget will calculate automatically)
Note: List proposed amounts by category even if there are no differences in the dollar amount.

Element of Cost	Original Budget Submission	Revised Budget Submission (4/14)	Percent of Total Negotiated Budget	Fringe Benefits and Indirects	
				Proposed Rate	Negotiated Rate
Personnel Fringe Benefits Travel Equipment Supplies Contractual Construction Other Total Direct Charges Indirect Charges	Redacted Exemption 4				
TOTAL					
Program Income	0	0	0%		
DOE Share (non-FFRDC)	$2,753,845	$6,503,098	Redacted Exemption 4		
DOE Share (FFDRC)	$36,250	$275,000			
Total DOE Share	$2,790,095	$6,778,098			
Non-Federal Cost Share	Redacted Exemption 4				

SEE ATTACHED SF 424A FOR BUDGET PERIOD BREAKDOWN

3. Total Allowable Adjustment without Concurrence from the Selection Official per the Selection Statement: 10%
Actual Total Adjustment based on Budget Table Above: 0%

Is the original budget the same as the negotiated budget: ☐ Yes ☒ No
If No, please check all boxes that apply:
☒ Change in the Project Scope
☐ Changes due to Time Delays
☐ Math Errors in Budget
☒ Changes in Indirect/Fringe Costs Caused Changes in Direct Costs or Total Project Costs
☐ Indirect/Fringe Rates incorrectly applied
☒ Other: Added cost share to coincide with federal funds to FFRDC, applied actual salaries and hours for personnel (the 4/8 submittal was estimated)

4. Briefly describe and explain any substantial change(s) to the original Statement of Project Objectives submitted by the recipient:

Project Officer commentary: The original Statement of Project Objectives included discussion of the entire project. The SOPO was revised to only include the details related to Budget Period 1. Finally, the final version included formatting revisions.

SECTION III – TECHNICAL EVALUATION SUMMARY

A. For each cost category, the Project Officer and the Specialist will complete his/her Technical Evaluation of the Negotiated Costs to confirm that they are all reasonable, allowable, and allocable. Additional comments should be added as necessary and as indicated below.

1. Personnel:

Total Negotiated Personnel Costs: $ Redacted Ex. 4 Not Applicable, the recipient did not propose personnel costs: ☐

Project Officer:

The labor hours proposed in the negotiated budget are reasonable for the scope of work: ☒

The labor mix proposed in the negotiated budget is reasonable: ☒

The personnel proposed for Budget Period 1 include the following: Principal Engineer, Principal Scientist, Project Director, Senior Engineer III, Senior Engineer II, Senior Engineer I, Project Engineer, Technician, Cost Estimator, Project Administrator, Administrative Assistant, and Support Staff. The changes to the personnel between the original application, Revision 1, and the final budget are due to the fact that the original budget and the first revision were based on estimates and position titles that needed to be aligned with the indirect rate proposal. The final budget submission included revised labor categories with actual salaries and revised time estimates to coincide with the BP1 scope. The proposed personnel, their estimated hours, and rates are reasonable and acceptable for the proposed BP1 scope.

Specialist:

Please fill out the following table with the negotiated costs:

Labor Type	Budget Period 1		
	Hours	Rate	Total
Redacted Exemption 4			

Negotiated labor rates are reasonable: ☒

Please detail the basis for the reasonable determination: These rates are reasonable for the amount of work to be done during Budget Period 1 of the project. Using websites, such as www.salary.com and www.bls.gov, these rates are appropriate for individuals in their field and location.

2. Fringe Benefits:

Total Negotiated Fringe Benefit Costs: Redacted Ex. 4 Not Applicable, the recipient did not propose fringe benefit costs: ☐

Specialist:

Does the Recipient have an approved rate agreement: ☐ Yes ☒ No

If Yes, List the Date of Rate Agreement:_____ Cite Federal Cognizant Agency _____

If No, select one of the following:
☐ Rate proposal was reviewed by the Cost/Price Analyst and found to be reasonable, allowable, and allocable (attach Cost/Price Analyst Determination)
☐ Rate Proposal was reviewed by the Cost/Price Analyst for a previous award (attach Cost/Price Analyst Determination)
List Date of review_____
☐ Specialist determined that rate was reasonable
☒ Other: **Due to time constraints, the "Reopener Clause" will be placed into the Special Terms and Conditions of the award. These costs will be addressed and approved at a later date.**

Please fill out the following table with the negotiated costs:

Personnel	Total Cost	Fringe Rate	Cost
Redacted Exemption 4			

The fringe benefit costs in the negotiated budget are reasonable: ☐ The difference of $2 is due to rounding errors and is insignificant.

3. Travel:

Total Negotiated Travel Costs: $ Redacted Exemption 4 Not Applicable, the recipient did not propose travel costs: ☐

Project Officer:

The number and type of trips proposed in the negotiated budget are reasonable for the scope of work: ☒

The costs per trip proposed in the negotiated budget are reasonable: ☒

Is foreign travel included in the negotiated budget: ☐ Yes ☒ No

Travel has been budgeted for Redacted Exemption 4

Travel estimates are based on internet prices, local hotel rates, and local per diem rates. The proposed travel is reasonable for the scope of work being performed during Budget Period 1.

☒ Specialist concurs.

4. Equipment:

Total Negotiated Equipment Costs: $0 Not Applicable, the recipient did not propose equipment costs: ☒

Project Officer:

The type(s) of equipment proposed in the negotiated budget is/are reasonable for the scope of work: ☒

The cost of equipment proposed in the original budget are reasonable: ☒

Is there any proposed equipment with a total cost exceeding $50,000: ☐ Yes ☒ No

☒ Specialist concurs.

5. Supplies:

Total Negotiated Supplies Costs: $ Redacted Exemption 4 Not Applicable, the recipient did not propose supplies costs: ☐

Project Officer:

The types /quantities of supplies proposed in the negotiated budget are reasonable based on the scope of work: ☒

The costs of supplies proposed in the negotiated budget are reasonable: ☒

Redacted Exemption 4 l e

The costs are reasonable and necessary relative to the work that will be completed in Budget Period 1.

☒ Specialist concurs.

6. Contractual:

Total Negotiated Contractual Costs: $ Redacted Ex. 4 Not Applicable, the recipient did not propose contractual costs: ☐

Project Officer:

The subrecipients proposed in the negotiated budget are appropriate for the scope of work: ☒

The contractual costs proposed in the negotiated budget are reasonable: ☒ Yes

Please fill out the following table with the negotiated costs:

Subrecipient/Vendor Name	Budget Period 1	Role in Project (Identify SOPO Tasks)
NMSU (subrecipient)	Redacted Exemption 4	
AMEC plc (vendor)		
Autodesk (vendor)		
Brown and Caldwell (vendor)		
Brown and Caldwell (vendor)		
Brown and Caldwell (vendor)		
Geomatrix (vendor)		
Geomatrix (vendor)		
Geomatrix (vendor)		
Geomatrix (vendor)		
Geomatrix (vendor)		
Harris Group (vendor)		
Harris Group (vendor)		
Harris Group (vendor)		
Harris Group (vendor)		
Redacted Exemption 4		
SNL (vendor)		
Total:		

Did the Recipient propose any subrecipients with total costs above $100,000? ☒ Yes ☐ No (If Yes, a separate Technical Evaluation/Negotiation Memorandum is required for each subrecipient/vendor – see below)

Separate Technical Evaluation/Negotiation Memorandums are not provided for the sub-recipient over $100,000. Based on the new risk thresholds ($1M), a separate evaluation is not required. However, the sub-recipient and vendors are described and evaluated below.

New Mexico State University (NMSU) is the only sub-recipient that has been included in Budget Period 1 – all others are vendors and the FFRDC. NMSU will be Redacted Exemption 4 Based on the work NMSU will be performing, the estimate is reasonable and acceptable.

A number of vendors were included that are performing a significant amount of services with Sapphire over the course of BP1. The vendors are listed and discussed below.

Geomatrix will be used to Redacted Exemption 4

The Harris Group will be used to Redacted Exemption 4

Brown and Caldwell will be used to Redacted Exemption 4

AMEC plc will be used for Redacted Exemption 4

Redacted Exemption 4

Autodesk ($ Redacted Exemption 4

Supplemental documentation (quotes and service agreements) has been provided to support many of the estimates above. However, due to the recent scope change for BP1 – including

Redacted Exemption 4

The supporting quotes/agreements for this work will be provided to further support the estimates. The Project Officer recommends that the vendor estimates be accepted as reasonable and acceptable as proposed.

FFRDC – Sandia National Laboratories – Sandia will be developing

Redacted Exemption 4

The work is relevant and necessary to the overall project and the estimate is reasonable and acceptable.

☒ Specialist concurs.

7. Construction:

Total Negotiated Construction Costs: $0 Not Applicable, the recipient did not propose construction costs: ☒

Project Officer:

The type of construction proposed in the original budget is appropriate for the scope of work: ☒

The construction costs proposed in the original budget are reasonable: ☒

☒ Specialist concurs.

8. Other Direct Costs:

Total Negotiated Other Direct Costs: $0 Not Applicable, the recipient did not propose other direct costs: ☒

Project Officer:

The other direct costs proposed in the original budget are reasonable for the scope of work: ☒

The costs proposed in the original budget for other direct costs are reasonable for the scope of work: ☒

☒ Specialist concurs.

9. Indirect Charges:

Total Negotiated Indirect Costs: $ Redacted Exemption 4 Not Applicable, the recipient did not propose indirect costs: ☐

Specialist:

Does the Recipient have an approved rate agreement: ☐ Yes ☒ No

If Yes, List the Date of Rate Agreement:_____ Cite Federal Cognizant Agency _____

If No, select one of the following:
☐ Rate proposal was reviewed by the Cost/Price Analyst and found to be reasonable, allowable, and allocable (attach Cost/Price Analyst Determination)
☐ Rate Proposal was reviewed by the Cost/Price Analyst for a previous award (attach Cost/Price Analyst Determination)
List Date of review_____
☐ Specialist determined that rate was reasonable
☒ Other: **Due to time constraints, the "Reopener Clause" will be placed into the Special Terms and Conditions of the award. These costs will be addressed and approved at a later date.**

The indirect costs proposed in the original budget are reasonable: ☐

10. Cost Share:

Project Officer:

Project is a: ☐ Research ☐ Development ☒ Demonstration ☐ Other: _____ (Explain)

The minimum recipient's cost share required for this award is: 20%
The recipient proposed cost share for this award is: Redacted Exemption 4

Does the proposed cost share meet the minimum requirement: ☒ Yes ☐ No

Sapphire will be providing Redacted Exemption 4 a cost share toward the BP1 expenses.

Specialist:

Is the proposed cost share: ☒ Cash ☐ In-kind

Third Party cost share commitment letters have been obtained: N/A; there are no third party contributions for BP1.

B. The following Project Officer and Specialist evaluation and negotiation commentary and recommendations address their agreement on all additional considerations for this award.

1. Please list any other special provisions agreed upon for inclusion in this award and describe the rationale for their inclusion below.

This recipient is receiving ARRA funds, and the Davis Bacon Act applies; therefore, the ARRA provisions have been included in the award. The indirect rates have not been negotiated for the prime and the reopener provision has been added to the Special Terms and Conditions of the award, so that we may address these at a later date. Continuation provision, Funding of Budget Periods, NEPA provisions, and a Contingency provision have also been included in the special terms and conditions of this award, due to the holds on budget period 2 for the prime and subrecipients.

2. If a negotiation strategy, or strategies, is/are specified in the selection statement, provide a discussion below of how this was addressed and resolved.

25% of Total Project Costs must be kept aside from the project budget as contingency for the project. This contingency is applicable to total project costs and will be verified by the Project Officer as requested and discussed in the Contingency Appendix that will be attached to the award. Contingency will be reported and tracked as well to address the 25% requirement per the Selection Statement.

3. Any other comments or concerns of the Project Officer and/or Specialist for this award, and the recommended approach to mitigating them, will be explained and addressed below.

All comments and concerns have been addressed.

4. Is this a Recovery Act award? ☒ Yes ☐ No

- If Yes, does the Buy American Act apply (see applicability below)? ☒ Yes ☐ No
- If Yes, does Davis Bacon Act apply (see applicability below)? ☒ Yes ☐ No

If the answer to either the Buy American Act or Davis Bacon Act questions is Yes, provide a short discussion below on: 1) the type of entity; 2) what applies; Davis Bacon, Buy American, or both; 3) whether it applies to the prime, subrecipient, or both; and 4) work to be performed that requires applicability of Buy American and/or Davis Bacon.

Sapphire Energy, Inc., their subrecipients, contractors, vendors, and other entities involved in this project will comply with Davis Bacon Act requirements where those requirements are applicable within the project.

SECTION IV – RECOMMENDATIONS/APPROVAL

Signatures of the Project Officer and Specialist, indicating their recommendations, as indicated below, will occur after their mutual agreement on the contents of this document, and before the review and approval process for the action. The signatures below indicate that the costs in the negotiated budget are reasonable, allowable, and allocable.

1. Technical Recommendation

The project costs are acceptable and should be considered for a financial assistance award. The resources have been reviewed relative to the Statement of Project Objectives and are found to be reasonable, except as previously noted herein.

Christy Sterner — Signature
4/22/10 — Date

Christy Sterner
Project Officer

2. Specialist Recommendation

In view of the above analysis, the technical evaluation, and considering all known factors, this Award is recommended.

Molly R Hames — Signature
04/22/10 — Date

Molly Hames
Grants and Agreements Specialist

3. Contracting Officer Approval *

☑ I concur with the above recommendation and have determined that the Recipient is responsible. I consider this Award to be in the best interest of the Government, and approve the award documents. (Select this box if the preparer is not the contracting officer)

☐ In view of the analysis, the technical evaluation, and considering all known factors, I have determined that the Recipient is responsible. This Award is considered to be in the best interest of the Government and approved. (Select this box if the preparer is also the contracting officer and indicate N/A in Block 2.)

Melissa Wise — Signature
4/26/10 — Date

Melissa Wise
Contracting Officer

PMC 410.1
(07/06)

U.S. DEPARTMENT OF ENERGY
PROJECT MANAGEMENT CENTER

FINANCIAL INFORMATION

PROVIDE ALL INFORMATION REQUESTED ON THIS FORM

Applicant: Sapphire Energy, Inc

Project Title: **Integrated Algal Biorefinery (IABR)**

Announcement/Award No: **DE-EE0002884**

1. Have you had prior Federal awards? ☒ Yes ☐ No

2. **Have you had an outside audit or an A-133 audit?** ☐ Yes ☒ No
If yes, please provide a copy of the A-133 or outside audit (electronic preferred).

INFORMATION FOR DETERMINING COGNIZANT AGENCY/OFFICE

3. Applicant's fiscal year end date is December 31

4a. Identify Cognizant **Federal Agency** (agency providing the preponderance of Federal funding), and provide Agency name, a point of contact, phone number, and e-mail.

Agency: US Department of Energy
Point of Contact: Christy Sterner
Phone: (303) 275-4720
E-mail: christy.sterner@go.doe.gov

4b. To assist our office in validating Cognizant **Federal Agency** (4a), please provide following information for the 5 highest dollar award value for current Federal contracts, grants or awards (do not include sub-awards). (State Agencies and Universities can skip 4b)

Contract/Award #	Awarding Agency	Awarding Office	Start Date	End Date	Total Value
DE-EE0002884	US Dept. of Energy	Melissa Wise	12/4/09	9/30/14	50,000,000
IIP-0839529	NSF	Arlington	01/19/09	N/A	66,667
1R43GM087020-01	NIH	Jeni Smits	01/09/09	8/31/10	100,000

5a. If applicant has current DOE awards, identify Cognizant **DOE Office** (office providing the preponderance of DOE funding), and provide DOE office name, a point of contact, phone number, and e-mail.

DOE Office: US Department of Energy
Point of Contact (Contracting Officer): Christy Sterner
Phone: (303) 275-4720
E-mail: christy.sterner@go.doe.gov

5b. To assist our office in validating Cognizant **DOE Office** (5a), please provide following information for the 5 highest dollar value awards for current DOE contracts, grants or awards (do not include sub-awards). (State agencies and Universities can skip 5b)

DOE Contract/Award #	DOE Awarding Office	Start Date	End Date	Total Value
DE-EE0002884	Melissa Wise	12/4/09	9/30/14	50,000,000

FINANCIAL MANAGEMENT SYSTEM

To qualify for Financial Assistance, compliance with 10 CFR 600.121 - Higher Education, Hospitals, and Other Non-Profit Organizations, 10 CFR 600.220(b) - State and Local Governments or 10 CFR 600.311 - For-Profit Organizations is required. Please check applicable boxes below.

☐ The Financial Management System is in compliance with 10 CFR 600.121, 10 CFR 600.220(b), or 10 CFR 600.311.

☒ I do not know if my Financial Management System is in compliance with 10 CFR 600.121, 10 CFR 600.220(b), or 10 CFR 600.311. If this block is checked, complete the survey below.

Accounting System Survey

	Yes	No	NA
1. Is your Accounting System in accordance with Generally Accepted Accounting Principles applicable to the circumstances?	☒	☐	☐
2. Accounting System provides for:			
a. Segregation of direct costs from indirect costs.	☒	☐	☐
b. Identification and accumulation of direct costs by project.	☒	☐	☐
c. A logical and consistent method for the allocation of indirect costs to intermediate and final cost objectives. (Project is final cost objective)	☒	☐	☐
d. Accumulation of costs under general ledger control.	☒	☐	☐
e. A timekeeping system that identifies employees' labor by intermediate and final cost objectives.	☒	☐	☐
f. A labor distribution system that charges direct and indirect labor to appropriate cost objectives.	☒	☐	☐
g. Interim (at least monthly) determination of costs charged to a project through routine posting of books of account.	☒	☐	☐
h. Excluding costs charged to Government projects which are not allowable in terms of FAR 31, Contract Cost Principles and Procedures, or other provisions.	☒	☐	☐
i. Identification of costs by project line item and by units (as if each unit or line item were a separate project) if required by the proposed award.	☒	☐	☐
3. Is the Accounting System designed, and are the records maintained in such a manner that adequate, reliable data are developed for use in developing cost proposals?	☒	☐	☐
4. Is the Accounting System currently in full operation?	☒	☐	☐

From:	Jim Butler
To:	Hames, Molly; Jaime Moreno; Brian Goodall
Cc:	Sterner, Christy; English, Christine
Subject:	RE: DOE Award: DE-EE0002884 - Sapphire Energy
Date:	Friday, March 05, 2010 12:41:35 PM

Molly,

Thank you for the clarification. I have reviewed the regulations and appendix. Since it seems based on the regulations that there is little if any room to negotiate, we agree to the terms of the patent clause waiver as is. Have a good weekend.

Regards,

Jim
James Butler, Ph.D., J.D.
Senior Director Intellectual Property
Sapphire Energy, Inc.
3115 Merryfield Row
San Diego, CA 92121
V: 858-768-4706
C: 858-997-3603
F: 858-768-4727

-----Original Message-----
From: Hames, Molly [mailto:molly.hames@go.doe.gov]
Sent: Friday, March 05, 2010 9:07 AM
To: Jim Butler; Jaime Moreno; Brian Goodall
Cc: Sterner, Christy; English, Christine
Subject: RE: DOE Award: DE-EE0002884 - Sapphire Energy

Hello,
I have contacted our IP counsel and they informed me that this clause set is set forth by regulation, 10 CFR 600.325 Appendix A, so it is non-negotiable.

Molly Hames
Grants & Agreements Specialist
U.S. Department of Energy
Golden Field Office
1617 Cole Blvd. Golden, CO 80401
Phone: 303-275-4864
Fax: 303-275-4754

-----Original Message-----
From: Jim Butler [mailto:james.butler@sapphireenergy.com]
Sent: Thursday, March 04, 2010 4:59 PM
To: Hames, Molly; Jaime Moreno; Brian Goodall
Subject: RE: DOE Award: DE-EE0002884 - Sapphire Energy

Hi Molly,

I have reviewed the patent clause wavier that you sent and was wondering if there was any room for negotiation. My specific concern deals with section (c)(3) which requires us to file a PCT application 10 months

following the Paris Convention filing rather than the normal 12 months. Since we are required to notify you prior to letting an application go abandoned, the 10 month requirement seems unnecessary and results in a shortening of the effective patent term.

Regards,

Jim
James Butler, Ph.D., J.D.
Senior Director Intellectual Property
Sapphire Energy, Inc.
3115 Merryfield Row
San Diego, CA 92121
V: 858-768-4706
C: 858-997-3603
F: 858-768-4727

-----Original Message-----
From: Hames, Molly [mailto:molly.hames@go.doe.gov]
Sent: Wednesday, March 03, 2010 1:07 PM
To: Jaime Moreno; Jim Butler; Brian Goodall
Cc: Wise, Melissa; Sterner, Christy; English, Christine
Subject: DOE Award: DE-EE0002884 - Sapphire Energy

Hello,
Attached is the patent clause waiver for your review. Please confirm in writing (e-mail is fine) by Friday, March 5, 2010 that you agree to the terms of the waiver.

If you have any questions, please let me know.

Thanks,

Molly Hames
Grants & Agreements Specialist
U.S. Department of Energy
Golden Field Office
1617 Cole Blvd. Golden, CO 80401
Phone: 303-275-4864
Fax: 303-275-4754

From: Jaime Moreno [jaime.moreno@sapphireenergy.com]
Sent: Thursday, April 22, 2010 9:35 AM
To: Sterner, Christy
Subject: RE: Award Documentation - PI

Thanks Christy,
Please list me as the PI and primary contact. Kulinda will not be rejoining Sapphire so its best to fix the discrepancy now.

Thanks,
Jaime

Jaime E. Moreno, P.E.
Vice President
Sapphire Energy, Inc.
27101 Puerta Real, Suite 280
Mission Viejo, CA 92691
949-202-4700 Office
949-367-0650 Fax
jaime.moreno@sapphireenergy.com

-----Original Message-----
From: Sterner, Christy [mailto:christy.sterner@go.doe.gov]
Sent: Thursday, April 22, 2010 8:23 AM
To: Jaime Moreno
Subject: Award Documentation - PI
Importance: High

Hi Jaime,

I hope all is well with you. I believe we've talked about this before, but I wanted to confirm this before proceeding. We currently continue to show Kulinda Davis as the PI and primary contact for the award. I'm reviewing the award documentation right now before it goes to the Contracting Officer and wanted to see if we should change the contact or not. Would you prefer that we list you as the PI or would you prefer to keep Kulinda Davis as the primary contact? Or someone else for that matter?

Thanks!

Best regards,

Christy Sterner
Project Officer
U.S. Department of Energy
Golden Field Office
Phone: 303-275-4720
Fax: 303-275-4753
email: christy.sterner@go.doe.gov

Go to http://www.eere.energy.gov/golden/funding.aspx for important news regarding Grants.gov.

From:	Sterner, Christy
To:	Hames, Molly
Subject:	Sapphire - PI Change
Date:	Friday, April 23, 2010 10:42:09 AM
Importance:	High

Hi Molly,

I saved the email request to change the PI/Primary Contact from Kulinda Davis to Jaime Moreno in the s: drive under Correspondence. I recommend that this change be approved. It also just occurred to me that all of the STRIPES award documents will have to be changed to reflect Jaime Moreno's information as well. His contact information is below.

Jamie E. Moreno; phone: 949-202-4701; jaime.moreno@sapphireenergy.com

Please let me know if you need any additional information. Thanks for your help!

Best regards,

Christy Sterner
Project Officer
U.S. Department of Energy
Golden Field Office
Phone: 303-275-4720
Fax: 303-275-4753
email: christy.sterner@go.doe.gov

Go to http://www.eere.energy.gov/golden/funding.aspx for important news regarding Grants.gov.

From: Dave Marsh [dave.marsh@sapphireenergy.com]
Sent: Friday, April 23, 2010 4:52 PM
To: Nelson, Brian E.; English, Christine; Sterner, Christy
Subject: Sapphire Additional Engineering Quotations for Budget Support
Attachments: SOW Work Order 05 19 Apr 2010.doc; IABR Design Proposal 04 21 10.pdf; PI1011 Sapphire DD prop rev 1 100423.pdf; Budget for Work Order 05 18 Apr 2010.pdf

Please find attached quotes from Harris Group, Brown and Caldwell and Geomatrix for BP1 design and permitting scopes.

The other two scopes of work from AMEC I don't have available as original pdfs so they are too big to send. I will transmit them when I can in the next couple of business days.

Thank you,

Dave Marsh

Sapphire Energy

27101 Puerta Real, Suite 280

Mission Viejo, CA 92691-8009

(949) 680 8754 mobile

(949) 367-0650 fax

(949) 202-4702 office

dave.marsh@SapphireEnergy.com <mailto:dave.marsh@SapphireEnergy.com>

Instructions and Summary

Award Number: DE-FOA-000096
Award Recipient: Sapphire / NMSU

Date of Submission: 6/30/2009
Form submitted by: Sapphire Energy
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel						
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
1. Generation 2A Receiver Design		**10000**		**$423,000**	**600**		**$24,000**	**800**		**$31,000**	**11400**	**$478,000**	**Actual Salary**
EXAMPLE	Sr. Engineer	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50.00	$10,000	**2400**	**$190,000**	Actual Salary
ONLY!!!	Electrical engineers	6200	$35.00	$217,000	400	$35.00	$14,000	600	$35.00	$21,000	**7200**	**$252,000**	Actual Salary
	Technician	1800	$20.00	$36,000	0	$0.00	$0	0	$0.00	$0	**1800**	**$36,000**	Actual Salary
Low Cost Pond Liner R&D													

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total fringe requested:	$0	$0	$0	**$0**

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information, if it has not already been provided to the Contracting Officer, OR if it has changed since it was. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the appliction of the approved rate, to arrive at the proposed fringes benefits dollars should also be provided.)

____ **There is not a current, federally approved rate agreement negotiated and available.**
(When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional explanation/comments (as necessary)

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Projecct Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement	2			2	$650	$1,300	Internet prices
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
						$0	
						$0	
						$0	
International Travel subtotal						$0	
Budget Period 1 Total						**$0**	

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 2							
Domestic Travel							
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
						$0	
						$0	
						$0	
International Travel subtotal						$0	
Budget Period 2 Total						**$0**	
Budget Period 3							
Domestic Travel							
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
						$0	
						$0	
						$0	
International Travel subtotal						$0	
Budget Period 3 Total						**$0**	
PROJECT TOTAL						**$0**	

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Thermal shock chamber	2	$20,000	$40,000	Vendor Quote	Reliability testing of PV modules- Task 4.3
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
Budget Period 1 Total			$0		
Budget Period 2					
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
Budget Period 2 Total			$0		

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 3					
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
EXAMPLE ONLY!!! Wireless DAS components	10	$360.00	$3,600	Catalog price	For Alpha prototype - Task 2.4
			$0		
Budget Period 1 Total			**$0**		
Budget Period 2					
			$0		
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! XYZ Corp.	Partner to develop optimal fresnel lens for Gen 2 product - Task 2.4	$48,000	$32,000	$16,000	**$96,000**
					$0
					$0
					$0
					$0
					$0

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
	Sub-total	$0	$0	$0	$0

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
EXAMPLE ONLY!!! ABC Corp.	Vendor for developing custom robotics to perform lens inspection, alignment, and placement (Task 4). Required for expanding CPV module mfg. capacity. Cost is from competitive quotes.	$32,900	$86,500		**$119,400**
					$0
					$0
					$0
					$0
					$0
					$0
					$0
		$0	$0	$0	$0

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
					$0
					$0
					$0
		$0	$0	$0	$0

Total Contractual		$0	$0	$0	$0

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

Example Only!!! - Build wind turbine platform

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Three days of excavation for platform site EXAMPLE ONLY!!!	$28,000	Engineering estimate	Site must be prepared for construction of platform.
Budget Period 1 Total	**$0**		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

General Description	Cost	Basis of Cost	Justification of need

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
EXAMPLE ONLY!!! Grad student tuition	$16,000	Established UCD costs	Support of graduate students working on project
Budget Period 1 Total	$0		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	0.0%	0.0%	0.0%	
Total indirect costs requested:				**$0**

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
(When this option is selected, a presentation of the budget that demonstrates the application of the approved rate, to arrive at the proposed indirect charges proposed should also be provided.)

_____ **There is no current, federally-approved indirect rate agreement.**
(When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal.)

Additional Explanations/Comments (as necessary)

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
ABC Company **EXAMPLE ONLY!!!**	Cash	Project partner ABC Company will provide 40 PV modules for product development at 50% off the of the retail price of $680	$13,600			**$13,600**
						$0
						$0
						$0
		Totals	**$0**	**$0**	**$0**	**$0**

Total Project Cost: $Redacted Exemption 4

Cost Share Percent of Award: Redacted Exemption 4

Additional Explanations/Comments (as necessary)

Instructions and Summary

Award Number: DE-EE0002884
Award Recipient: Sapphire Energy, Inc.

Date of Submission: 4/14/2010
Form submitted by: Sapphire Energy, Inc.
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel	Redacted Exemption 4					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Additional Explanations/Comments (as necessary)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
Sapphire Project Management and Engineering													
	Redacted Exemption 4												

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	Redacted Exemption 4			
Total fringe requested:				-

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-424A.

_____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
**In the area designated below, identify the full calculations used to derive the total fringe costs. See further information below.*

X **There is not a current, federally approved rate agreement negotiated and available.**
*When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal. * In the area designated below, identify the full calculations used to derive the total fringe costs. See further information below.*

Additional explanation/comments (as necessary)

*IMPORTANT: In the space provided below (or as an attachment) provide a complete explanation and the full calculations used to derive the total fringe costs. If the total fringe costs are a cumulative amount of more than one calculation or rate application, the explanation and calculations should identify all rates used, along with the base they were applied to (and how the base was derived), and a total for each (along with grand total). The rates and how they are applied should not be averaged to get one fringe cost percentage. NOTE: The fringe benefit rate should be applied to both the Federal Share and Recipient Cost Share.

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Projecct Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
Redacted Exemption 4							
International Travel							
						$0	
						$0	
						$0	
						$0	
International Travel subtotal						$0	
Budget Period 1 Total						Ex.4	

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 2							
Domestic Travel							
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
						$0	
						$0	
						$0	
International Travel subtotal						$0	
Budget Period 2 Total						**$0**	
Budget Period 3							
Domestic Travel							
						$0	
						$0	
						$0	
						$0	
						$0	
						$0	
Domestic Travel subtotal						$0	
International Travel							
						$0	
						$0	
						$0	
						$0	
International Travel subtotal						$0	
Budget Period 3 Total						**$0**	
PROJECT TOTAL						Ex. 4	

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .

List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
			$0		
			$0		
Budget Period 1 Total			$0		
Budget Period 2					
			$0		
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			**$0**		

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
Redacted Exemption 4					
Budget Period 2					
			$0		
			$0		
Budget Period 2 Total			$0		
Budget Period 3					
			$0		
			$0		
Budget Period 3 Total			$0		
PROJECT TOTAL			Ex. 4		

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipeint entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
NMSU	Redacted Exemption 4				

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
Geomatrix	Redacted Exemption 4				
Harris Group					

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
Autodesk	Redacted Exemption 4				
Geomatrix					
Redacted Exemption 4					
Brown and Caldwell					
Geomatrix					
Geomatrix					
Harris Group					
Brown and Caldwell					
Geomatrix					
Harris Group					
Harris Group					
Brown and Caldwell					
AMEC plc					

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
SNL	Redacted Exemption 4				

Total Contractual	Redacted Exemption 4

AdditionalExplanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Budget Period 1 Total	**$0**		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Budget Period 1 Total	$0		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	Redacted Exemption 4			
Total indirect costs requested:				

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
**In the area designated below, identify the full calculations used to derive the total indirect costs. See further information below.*

X **There is no current, federally-approved indirect rate agreement.**
*When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal. *In the area designated below, identify the full calculations used to derive the total indirect costs. See further information below.*

Additional Explanations/Comments (as necessary)

*IMPORTANT: In the space provided below (or as an attachment) provide a complete explanation and the full calculations used to derive the total indirect costs. If the total indirect costs are a cumulative amount of more than one calculation or rate application, the explanation and calculations should identify all rates used, along with the base they were applied to (and how the base was derived), and a total for each (along with grand total). The rates and how they are applied should not be averaged to get one indirect cost percentage. NOTE: The indirect rate should be applied to both the Federal Share and Recipient Cost Share.

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
Sapphire Energy	Redacted Exemption 4					
				Redacted Exemption 4		

Total Project Cost: $ Redacted Exemption 4 **Cost Share Percent of Award:** Ex. 4

Additional Explanations/Comments (as necessary)

PMC 121.1
(07/2008)

U.S. DEPARTMENT OF ENERGY
PROJECT MANAGEMENT CENTER

PRE-AWARD INFORMATION SHEET

ALL INFORMATION REQUESTED ON THIS FORM MUST BE PROVIDED

Awardee Name:	Sapphire Energy, Inc.
Award Number:	DE-EE0002884
Awardee Business Officer:	David Buttaro
Awardee Project Director:	Jaime Moreno

Employer/Taxpayer Identification Number (EIN/TIN):	Redacted Exemption 3
Data Universal Numbering System (DUNS):	798830688

For assistance in obtaining a DUNS Number, call Dunn & Bradstreet at 1-800-333-0505.
The Applicant should be prepared to provide the following information to Dunn & Bradstreet:
(1) Company name
(2) Company address
(3) Company telephone number
(4) Line of business
(5) Chief executive officer/key manager
(6) Date the company was started
(7) Number of people employed by the company
(8) Company affiliation

Note: Awardee Name, EIN/TIN and DUNS MUST coincide with the Awardee's information recorded in the Central Contract Registry (CCR).

A. TYPE OF BUSINESS - the Awardee is a:

- ☒ For-Profit Organization (Other than Small Business)
  - ☒ Corporation
  - ☐ Partnership
  - ☐ Sole Proprietorship
- ☐ Government
  - ☐ Local Government
  - ☐ State Government
  - ☐ Indian Tribal Government
- ☐ Individual
- ☐ Institution of Higher Education
- ☐ Other NonProfit Organization
- ☐ Small Business
- ☐ Other (specify):

If NonProfit, select one below:

☐ A university or other institution of higher education or an organization of the type described in Section 501(c)(3) of the Internal Revenue Code of 1954 (26 USC 501(c)) and exempt from taxation under Section 501(a) of the Internal Revenue Code (26 USC 501(a)); or

☐ An organization of the type described in Section 501(c)(4) of the Internal Revenue Code of 1954 (26 USC 501(c)) and exempt from taxation under Section 501(a) of the Internal Revenue Code (26 USC 501(a)); or

☐ An organization of the type described in Section 501(c)(6) of the Internal Revenue Code of 1954 (26 USC 501(c)) and exempt from taxation under Section 501(a) of the Internal Revenue Code (26 USC 501(a)); or

☐ A nonprofit scientific or educational organization qualified under a State nonprofit organization statute. (Please identify the statute.); or

☐ Other (specify type):

Is the Applicant a member of the Federal Demonstration Partnership (FDP)? ☐ Yes ☒ No
A listing of FDP members is available at http://www.thefdp.org/FDP_Members.html.

B. INTELLECTUAL PROPERTY

1. WAIVER OF DOE PATENT RIGHTS

This section applies only to large businesses and nonprofits other than 501(c)(3) organizations. All others should leave this subsection blank and proceed to the "Rights in Application Data" subsection that follows. Large businesses and nonprofits other than 501(c)(3) organizations have the right to request, in advance or within 30 days after execution of an award, in accordance with applicable statutes and DOE Patent Waiver Regulation (10 CFR 784), a waiver of all or any part of the rights of the United States in Subject Inventions. Accordingly, please check all that apply:

☒ I intend to request an advance waiver in accordance with 10 CFR 784.
☐ I intend to request an advance waiver on behalf of one or more subrecipients/subcontractors.
☐ I have at least one subrecipient/subcontractor that will request a waiver on its own behalf.
☐ I do not intend to request an advance waiver.

2. RIGHTS IN APPLICATION DATA

For an award based on an application/proposal, the Government will obtain unlimited rights in the technical data contained in the application/proposal, unless the Awardee marks those portions of the technical information which it asserts as "proprietary data" or specifies those portions of such technical data which are not directly related to or will not be utilized in the work to be funded under this award.

Accordingly, please indicate:

☐ No restrictions on Government rights in technical data contained in the application/proposal; or

☒ The application/proposal contains the following identified technical data that is proprietary, or is not directly related to, or will not be utilized in the work to be funded under this award.

Please list specific page numbers, table numbers, etc., and the dated version of the application/proposal to which you refer: Project Narrative pgs.1-15; Project Management Plan pgs. 1-28; Business & Commercialization Plan pgs. 1-20; Project Execution Plan pgs. 1-60; Environmental Questionnaire pgs. 1-15; Intellectual Property Statement pgs. 1-5.

3. IDENTIFICATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE

Below, please identify any Limited Rights Data or Restricted Computer Software you plan to use to carry out your work under the award. Limited Rights Data means data (other than computer software) developed at private expense that embody trade secrets or are commercial or financial, and confidential or privileged. Restricted Computer Software means computer software developed at private expense and that is a trade secret, is commercial or financial, and confidential or privileged, or is published, copyrighted computer software, to include modifications of the computer software.

Please note that these data do not include data that you will produce under this award. Data that is first produced under this award is treated separately under the data rights clause of this award. This section covers only those data that you bring into this award that were privately funded.

If you plan to use Limited Rights Data or Restricted Computer Software under the award, please describe it in a few sentences or bullets, with sufficient detail that the DOE Project Officer can determine whether DOE will need to have any of it delivered, for example, to validate your results or the data produced under the award. You are not required to list issued patents or published patent applications. You do need to list unpublished patent applications (by title and brief description) and trade secret processes (by non-proprietary title with brief, non-proprietary description). If you have questions regarding the completion of this section, please contact the Contract Specialist handling your award.

Based on the above, please review the requirements in the technical scope of work for this award and indicate, to the best of your knowledge:

☐ No Limited Rights Data will be utilized in the performance of this award.

☒ Limited Rights Data as follows will be utilized in the performance of this award.

Use this block to provide additional information or provide an attachment: Biological, chemical, process and techno economic data that serve as decision information for IABR design, construction and operation

Based on the above, please review the requirements in the technical scope of work for this award and indicate, to the best of your knowledge:

☒ Awardee Restricted Computer Software will NOT be utilized in the performance of this award.

☐ Awardee Restricted Computer Software as follows will be utilized in the performance of this award.

Use this block to provide additional information or provide an attachment:

C. PROJECT PERFORMANCE SITE and CONGRESSIONAL DISTRICT

List the address and congressional district for the primary site where the work will be performed:

Street Address:	
City:	Columbus
State:	New Mexico
Zip:	88029
Congressional District:	2

If a portion of the work will be performed at any other site(s), identify those site(s) below, and indicate what portion of the effort will be performed at this/these site(s):

Street Address:	27101 Puerta Real, Suite 280
City:	Mission Viejo
State:	CA
Zip:	92691
Congressional District:	42

Briefly describe portion of effort for this Site:	Design & Engineering; Project Management

D. INVOICING AND PAYMENTS

1. Has the Awardee received any prior DOE awards administered by the Golden Field Office (GO)?

☐ Yes

If yes, please list the most recent award number: _____

☒ No

2. Is the Awardee currently enrolled with the U.S. Department of Treasury / ASAP system (Automated Standard Application for Payment System) under the DOE / Golden Field Office (GO) Agency Locator Code (ALC) and Region Code (#8900-0001-04)?

☐ Yes

Enter Awardee Seven-digit ASAP ID Number: _____

☒ No

3. Please provide the following contact information for ASAP and/or Payments:

IMPORTANT: If not currently enrolled in the ASAP system under GO's ALC and Region Code, the person identified below will be contacted by the U.S. Department of Treasury with further instruction on completing the ASAP enrollment process.

ASAP / Payments Contact Person: David Buttaro

Phone No.: 858-768-4704 Extension: _____ E-mail: David.buttaro@sapphireenergy.com

4. Indicate preferred payment method below: (NOTE: this section is reserved for universities, hospitals, other non-profit organizations and state and local governments that are authorized Advance Payment Procedures, unless a specific need is supported. All other entities desiring advance payment should discuss with the DOE Award Administrator.)

☐ Payment by Advance is preferred. (SF 272 reporting will be required.)
☒ Payment by Reimbursement is preferred. (SF 272 reporting will not be required.)

5. Indicate the name, phone number, and email address of the Designated Responsible Employee for complying with national policies prohibiting discrimination (see 10 CFR 1040.5 and the Certifications and Assurances found at http://management.energy.gov/documents/CERTSASSUR.doc).

Cynthia J. Warner	(858) 768-4713
Name	Telephone Number
President	**cj.warner@sapphireenergy.com**
Title	Email Address

REPRESENTATION/CERTIFICATION

I represent by my signature below that all the information provided by this form is accurate.

Name: Jaime E. Moreno

Title: Vice President of Projects

Signature of Authorized Company Official:

Date: 3/26/2010

PMC 410.1

(07/06)

U.S. DEPARTMENT OF ENERGY
PROJECT MANAGEMENT CENTER

FINANCIAL INFORMATION

PROVIDE ALL INFORMATION REQUESTED ON THIS FORM

Applicant: Sapphire Energy, Inc

Project Title: **Integrated Algal Biorefinery (IABR)**

Announcement/Award No: **DE-EE0002884**

1. Have you had prior Federal awards? ☒ Yes ☐ No

2. Have you had an outside audit or an A-133 audit? ☐ Yes ☒ No

If yes, please provide a copy of the A-133 or outside audit (electronic preferred).

INFORMATION FOR DETERMINING COGNIZANT AGENCY/OFFICE

3. Applicant's fiscal year end date is December 31

4a. Identify Cognizant **Federal Agency** (agency providing the preponderance of Federal funding), and provide Agency name, a point of contact, phone number, and e-mail.

Agency: US Department of Energy
Point of Contact: Christy Sterner
Phone: (303) 275-4720
E-mail: christy.sterner@go.doe.gov

4b. To assist our office in validating Cognizant **Federal Agency** (4a), please provide following information for the 5 highest dollar award value for current Federal contracts, grants or awards (do not include sub-awards). (State Agencies and Universities can skip 4b)

Contract/Award #	Awarding Agency	Awarding Office	Start Date	End Date	Total Value
DE-EE0002884	US Dept. of Energy	Melissa Wise	12/4/09	9/30/14	50,000,000
IIP-0839529	NSF	Arlington	01/19/09	N/A	66,667
1R43GM087020-01	NIH	Jeni Smits	01/09/09	8/31/10	100,000

5a. If applicant has current DOE awards, identify Cognizant **DOE Office** (office providing the preponderance of DOE funding), and provide DOE office name, a point of contact, phone number, and e-mail.

DOE Office: US Department of Energy
Point of Contact (Contracting Officer): Christy Sterner
Phone: (303) 275-4720
E-mail: christy.sterner@go.doe.gov

5b. To assist our office in validating Cognizant **DOE Office** (5a), please provide following information for the 5 highest dollar value awards for current DOE contracts, grants or awards (do not include sub-awards). (State agencies and Universities can skip 5b)

DOE Contract/Award #	DOE Awarding Office	Start Date	End Date	Total Value
DE-EE0002884	Melissa Wise	12/4/09	9/30/14	50,000,000

FINANCIAL MANAGEMENT SYSTEM

To qualify for Financial Assistance, compliance with 10 CFR 600.121 - Higher Education, Hospitals, and Other Non-Profit Organizations, 10 CFR 600.220(b) - State and Local Governments or 10 CFR 600.311 - For-Profit Organizations is required. Please check applicable boxes below.

☐ The Financial Management System is in compliance with 10 CFR 600.121, 10 CFR 600.220(b), or 10 CFR 600.311.

☒ I do not know if my Financial Management System is in compliance with 10 CFR 600.121, 10 CFR 600.220(b), or 10 CFR 600.311. If this block is checked, complete the survey below.

Accounting System Survey

	Yes	No	NA
1. Is your Accounting System in accordance with Generally Accepted Accounting Principles applicable to the circumstances?	☒	☐	☐
2. Accounting System provides for:			
a. Segregation of direct costs from indirect costs.	☒	☐	☐
b. Identification and accumulation of direct costs by project.	☒	☐	☐
c. A logical and consistent method for the allocation of indirect costs to intermediate and final cost objectives. (Project is final cost objective)	☒	☐	☐
d. Accumulation of costs under general ledger control.	☒	☐	☐
e. A timekeeping system that identifies employees' labor by intermediate and final cost objectives.	☒	☐	☐
f. A labor distribution system that charges direct and indirect labor to appropriate cost objectives.	☒	☐	☐
g. Interim (at least monthly) determination of costs charged to a project through routine posting of books of account.	☒	☐	☐
h. Excluding costs charged to Government projects which are not allowable in terms of FAR 31, Contract Cost Principles and Procedures, or other provisions.	☒	☐	☐
i. Identification of costs by project line item and by units (as if each unit or line item were a separate project) if required by the proposed award.	☒	☐	☐
3. Is the Accounting System designed, and are the records maintained in such a manner that adequate, reliable data are developed for use in developing cost proposals?	☒	☐	☐
4. Is the Accounting System currently in full operation?	☒	☐	☐

Sapphire Energy, Inc.

Draft Indirect Rate Summary

Fringe Rate		
	2010	2011
Redacted Exemption 4		

Research Overhead Rate		
	2010	2011
Redacted Exemption 4		

G&A Rate		
	2010	2011
Redacted Exemption 4		

Composite G&A Rate	
	2010-2011
Redacted Exemption 4	

Sapphire Energy, Inc.
Fringe Rate Detail Summary

Fringe Expenses		
Department	**2010**	**2011**

Redacted Exemption 4

Add: Vacation Adjustment (3 weeks - 15 days)		
Department	**2010**	**2011**

Redacted Exemption 4

Add: Holiday Adjustment (2.4 weeks - 12 Days)		
Department	**2010**	**2011**

Redacted Exemption 4

Fringe Pool - Adjusted		
Department	**2010**	**2011**

Redacted Exemption 4

Fringe Rate		
	2010	**2011**

Redacted Exemption 4

Sapphire Energy, Inc.

Research Overhead Detail Summary

Research Labor		
Department	**2010**	**2011**

Redacted Exemption 4

Less: Research Labor Vacation Adjustment (3 weeks - 15 days)		
Department	**2010**	**2011**

Redacted Exemption 4

Less: Research Labor Holiday Adjustment (2.4 weeks - 12 days)		
Department	**2010**	**2011**

Redacted Exemption 4

Adjusted Research Labor		
Department	**2010**	**2011**

Redacted Exemption 4

Redacted Exemption 4

Research Expense Pool		
Department	**2010**	**2011**

Redacted Exemption 4

Research Overhead Rate		
	2010	**2011**

Redacted Exemption 4

Sapphire Energy, Inc.

G&A Rate Detail Summary

G&A Labor		
Department	**2010**	**2011**

Redacted Exemption 4

Less: G&A Labor Vacation Adjustment (3 weeks - 15 days)		
Department	**2010**	**2011**

Redacted Exemption 4

Less: G&A Labor Holiday Adjustment (2.4 weeks - 12 days)		
Department	**2010**	**2011**

Redacted Exemption 4

Adjusted G&A Labor		
Department	**2010**	**2011**

Redacted Exemption 4

Redacted Exemption 4

G&A Non-Labor Expenses		
Department	**2010**	**2011**

Redacted Exemption 4

Total G&A Expense Pool		
	2010	**2011**

Redacted Exemption 4

G&A Rate		
	2010	**2011**

Redacted Exemption 4

2010-2011 Composite G&A Rate	
	2010-2011

Redacted Exemption 4

Sapphire Energy, Inc.
Project Expense Detail Summary

Project Labor		
Department	**2010**	**2011**

Redacted Exemption 4

Less: Project Labor Vacation Adjustment (3 weeks - 15 days)		
Department	**2010**	**2011**

Redacted Exemption 4

Less: Project Labor Holiday Adjustment (2.4 weeks - 12 days)		
Department	**2010**	**2011**

Redacted Exemption 4

Adjusted Project Labor		
Department	**2010**	**2011**

Redacted Exemption 4

Redacted Exemption 4

Project Expenses (Included in budget)		
Department	**2010**	**2011**

Redacted Exemption 4

Subcontractor Proposal Expenses (Not included in budget)		
Subcontractor	**2010**	**2011**

Redacted Exemption 4

Other Proposal Expenses (Not included in budget)		
	2010	**2011**

Redacted Exemption 4

Total Project Expenses		
	2010	**2011**

Redacted Exemption 4

Sapphire Energy, Inc.

Unallowable Cost Detail Summary

Unallowable Costs		
Department	**2010**	**2011**

Redacted Exemption 4

= Related to G&A related expenses

= Pro Rata Allocation to G&A, Research, and Project Related expenses

= Related to Research related expenses

Applicant Name: Sapphire Energy - BP1, FY2010 Award Number: DE-EE0002884.002 Attachment 4

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. IABR BP-1				$6,503,098	Redacted Exemption 4	
2.						
3.						
4.						
5. Totals		$0	$0	$6,503,098		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	(1)	(2)	(3)	(4)	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income	$0				$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Applicant Name: New Mexico State University Award Number: DE-EE0002884

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. Budget Period 1	81.087			$225,000	Redacted Exemption 4	
2.						
3.						
4.						
5. Totals		$0	$0	$225,000		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	(1)Budget Period 1	(2)	(3)	(4)	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income	$0				$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

STATEMENT OF PROJECT OBJECTIVES

Sapphire Energy, Inc.
Recovery Act – Sapphire Integrated Algal Biorefinery (IABR)

A. PROJECT OBJECTIVES

The Sapphire Integrated Algal Biorefinery (IABR) project will realize the following objectives:

1. The design and construction of: all required infrastructure, including equipment, design and control methods, for the production of algal oil for green jet fuel and green diesel.

2. The shakedown and testing of: material and energy flows for all processes inputs and product flows and comparison of different process operating conditions, product flow rates and yields from different commercial algal strains against model projections.

3. The establishment of: steady state operations including material and energy balances; plant process design, including operating conditions, cash flow and capital requirements for a full-scale commercial plant capable of producing greater than 150 million gallons of algae oil per year (10,000 bpd).

B. PROJECT SCOPE

The IABR will be built in Luna Country, near Columbus, New Mexico. The algae will fix approximately 56 metric tons of CO_2 per day and produce, on average, 100 barrels of green crude oil per day, or approximately 1 million gallons per year of finished fuel product. The successful project will demonstrate the technical and economic feasibility of the algae to green fuels process that will form the basis for a series of commercial scale biorefineries.

C. TASKS TO BE PERFORMED

Budget Period 1:

A Phase 0 – Origination

A.1 DOE Project Periods
Project budget Periods defined.

A.2 DOE Core Work Breakdown Structure (WBS) Elements
DOE Core WBS Elements included in WBS structure for project tracking purposes.

A.3 Feasibility Study
Overall project concept feasibility study.

A.4 Phase 0 Stage Gate Evaluation GN - Go/No Go Decision

A.4.ML.1 Phase 0 Stage Gate Complete
Complete project Stage Gate evaluation.

B **Phase 1 – Conceptual Analysis**

B.1 Process Development (Front End Loading (FEL) – 1)
Project scope definition, initial process diagrams, capital cost estimation, equipment list and layout, Class 40 Estimation level. Project siting studies, permitting investigation, long lead permit activity and site due-diligence work. Identification of potential project site(s).

Redacted Exemption 4

B.1.ML.1 FEL-1 Complete E – Project Internal Tracking
FEL-1 Engineering work complete; internal tracking milestone. Indicates completion of B.1 subtask.

B.2 Phase 1 Stage Gate Evaluation

B.2.GN.1 **Phase 1 Stage Gate Evaluation** GN - Go/No Go Decision
Project Stage Gate Evaluation.

C **Phase 2 – Process Design**

C.1 Process Definition (FEL-2)
Engineering, planning and estimation work to refine process diagrams, energy balances, capital and operating expense estimates, equipment list and site general arrangement. Estimation to Class 25 Level.

Redacted Exemption 4

C.1.ML.1 FEL-2 Complete E – Project Internal Tracking
Front End Loaded-2 engineering work complete; internal tracking milestone. Indicates completion of C.1 subtasks.

C.1.ML.2 30% Design Complete E – Project Internal Tracking
Milestone indicating project design has reached 30% design level. Information and design basis supplied to permitting activities to proceed with final permitting activities.

C.2 Site Planning
Finalization of project site selection.
Completion of required site due-diligence efforts.
Completion of regulatory and permitting requirements review and scope.

C.2.ML.1 Land Purchase Option Executed E – Project Internal Tracking
Project site real property secure.

C.3 Phase 2 Stage Gate Evaluation

C.3.GN.1 Phase 2 Stage Gate Evaluation GN - Go/No Go Decision
Project Stage Gate evaluation.

D Phase 3 - Front End Engineering Design (FEL-3)

D.1 Front End Engineering Design FEL-3
Front End Engineering work to FEL-3 level deliverables.

D.1.ML.1 FEL-3 Complete E – Project Internal Tracking
Front End Loaded-3 engineering work complete; internal tracking milestone. Indicates completion of C.1 subtasks.

D.2 Permitting
Completion of all required permitting activities for project construction and operation.

D.2.ML.1 Receipt of 30% Design E – Project Internal Tracking
Thirty percent design received from FEL engineering activities; allowing permitting to proceed to completion.

D.2.ML.2 Permitting Complete E – Project Internal Tracking
All project permits secured.

D.3 NEPA
Formal NEPA review.

D.3.ML.1 NEPA Finding Issued E – Project Internal Tracking
NEPA process complete and agency NEPA determination issued.

D.4 Phase 3 Gate Evaluation

D.4.GN.1 Phase 3 Stage Gate Evaluation — GN – Go/No Go Decision
Project Stage Gate evaluation.

E Research and Development

E.1 Pond Liner Research
Technology development to advance pond liner design and economics.

E.2 Pond Modeling
Technology development to reduce pond construction and operation costs.

F Project Management and Reporting
Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting Checklist following the instructions included therein

Budget Period 2 (and any other potential budget periods): TBD

Details of Budget Period 2 tasks consisting of, and not limited to, final engineering design, construction, shakedown, and operation will be determined prior to the conclusion of Budget Period 1.

Redacted
Exemption 4

Material Safety Data Sheet

Issue date: 09/12/2001
Revision date: 05/01/2005

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Supplier: Redacted Exemption 4

Emergency telephone number: Redacted Exemption 4

Customer service number:

Product name:

2. HAZARDS IDENTIFICATION

Emergency overview: Avoid contact with skin and eyes.
Do not breathe vapors or spray.

This material is not a controlled product under WHMIS

Properties affecting health: May cause eye/skin irritation.

Principle routes of exposure:

Eye Contact: Contact with eyes may cause irritation.
Skin contact: May cause skin irritation.
Ingestion: May cause nausea and irritation
Inhalation: May cause minor irritation if mist or spray is inhaled.

Physico-chemical properties: No hazards resulting from material as supplied.

Hazard information:

Target organ effects: Eyes
Skin
Reproductive effects: None known.
Mutagenic effects: None known.
Sensitization: None known.

Signs and symptoms: None.

Medical conditions aggravated by exposure: None known.

3. COMPOSITION/INFORMATION ON INGREDIENTS

The product contains no substances which at their given concentration, are considered to be hazardous to health

4. FIRST AID MEASURES

Eye contact: In the case of contact with eyes, rinse immediately with plenty of water for 15 minutes and Seek medical attention

Skin contact: Rinse skin continuously for 15 minutes after washing with soap and water. If a person feels unwell or symptoms of skin irritation appear, consult a physician.

Ingestion: If ingested drink two glasses of water. Do not induce vomiting. Seek medical attention.

Inhalation: Move to fresh air immediately. If experiencing difficulty breathing, seek medical attention.

Protection of first-aiders: Wear suitable gloves and eye/face protection.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Use any extinguishing media which is suitable for the surrounding fire.

Extinguishing media which must not be used for safety reasons: None.

Special protective equipment for firefighters: Wear self-contained breathing apparatus and protective suit.

Specific methods: None.

Hazardous combustion products: No significant combustion products likely.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Ensure adequate ventilation. Wear suitable gloves and eye/face protection

Environmental precautions: Waste disposal must be in accordance with appropriate US, Federal, State and International regulations.

Methods for cleaning up: Wipe up with adsorbent material (e.g. cloth, fleece).
Clean contaminated surface thoroughly.

7. HANDLING AND STORAGE

Handling:

Technical measures/precautions: Wear protective safety glasses, gloves and clothing.

Safe handling advice: Wear disposable gloves while handling reagents. Thoroughly wash hands afterwards. Avoid contact with skin and eyes.

Storage:

Technical measures/storage conditions: Do not freeze.

Incompatible products: No special restrictions on storage with other products.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls: Ensure adequate ventilation.

Personal protective equipment

Eye protection: Wear safety glasses with side-shields.

Hand protection: Wear disposable gloves while handling kit reagents. Thoroughly wash hands afterwards.

Skin and body protection Wear suitable protective clothing. Wear suitable gloves and eye/face protection.

Respiratory protection: In case of mist, spray or aerosol exposure wear suitable personal respiratory protection and protective suit.

Other/general protection: None.

9. PHYSICAL AND CHEMICAL PROPERTIES

General Information

Physical state: Redacted Exemption 4
Color:
Odor:

Important Health Safety and Environmental Information

Flash point: Redacted Exemption 4
Specific gravity:
pH:

Boiling point/range: Redacted Exemption 4
Vapor pressure:

Other information

Explosivity: Redacted Exemption 4

10. STABILITY AND REACTIVITY

Chemical stability: Stable under recommended storage conditions.
Materials to avoid: None known.
Conditions to avoid: Do not freeze.
Hazardous polymerization: Hazardous polymerization does not occur.
Hazardous decomposition products: Not applicable.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Eye contact: Contact with eyes may cause irritation.
Skin contact: May cause skin irritation.

Subchronic toxicity

Skin contact: Repeated or prolonged exposure to the skin could cause irritation.

Chronic toxicity

Skin contact: Repeated or prolonged exposure to the skin could cause irritation.

Specific effects

Sensitization: No effects expected.
Target organ effects: Eyes
Skin

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects: This product has no known eco-toxicological effects.
Aquatic toxicity effects: No data available.

Mobility: No data available.
Persistence / degradability: No data available.
Bioaccumulation: No data available.
Degradation: No data available.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products: Waste disposal must be in accordance with appropriate US, Federal, State and International regulations.
Contaminated packaging: Waste disposal must be in accordance with appropriate US, Federal, State and International regulations.

14. TRANSPORT INFORMATION

Product not regulated by DOT, IATA/ICAO, IMO/IMDG, ADR/RID, or TDG.

15. REGULATORY INFORMATION

SARA (311, 312) hazard class

Immediate health: None.
Delayed health: None.
Fire: None.
Sudden Release of Pressure Hazard: None.
Reactivity: None.

Inventory Information:

United States (USA): All of the chemicals present in the product are found on the TSCA (Toxic Substances Control Act) Inventory or are not required to be listed on the TSCA chemical inventory..

Canada: All components of this product are included on the Domestic Substances List (DSL) or are not required to be listed on the DSL.

European Union (EU): All components of this product are included on the European Inventory of Existing Chemical Substances (EINECS) or are not required to be listed on EINECS.

Australia: All components of this product are included in the Australian Inventory of Chemical Substances (AICS).

China: All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese inventory.

Japan: All components of this product are included on the Japanese(ENCS)inventory or are not required to be listed on the Japanese inventory.

Korea: All components of this product are included on the Korean(ECL)inventory or are not required to be listed on the Korean inventory.

Philippines: All components of this product are NOT included on the Philippine (PICCS) inventory.

State Regulations: None.

Other Environmental Information:

The following components of this product may be subject to reporting requirements pursuant to Section 313 of CERCLA (40 CFR 372), Section 12(b) of TSCA, or may be subject to release reporting requirements (40 CFR 307, 40 CFR 311, etc.):

This product does not contain any components regulated under these sections of the EPA

International Inventories
WHMIS:
WHMIS trade secret: None.
WHMIS hazard class: None.

Notes:
1. SARA = Superfund Amendments and the Reauthorization Act.
2. CERCLA = Comprehensive Environmental Response, Compensations and Liability Act.
3. FIFRA = Federal Insecticide, Fungicide and Rodenticide Act.
4. TSCA = Toxic Substance Control Act.
5. WHMIS = Canadian Workplace Hazardous Materials Information System.
6. This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. OTHER INFORMATION

NFPA Hazard Rating (National Fire Protection Association):
Health = 1
Flammability = 0
Reactivity = 0

This data sheet contains changes from the previous version in section(s): 9-16
Reason for changes: Additional regulatory information and adopt ANSI Z400.1-2004 standard

MSDS format: North American Format - U.S. and Canada
This Material Safety Data Sheet was prepared in accordance with ANSI Z400.1-2004.

Disclaimer:
Redacted
The information and recommendations contained herein are based upon tests believed to be reliable. However, Exemption 4 does not guarantee their accuracy or completeness NOR SHALL ANY OF THIS INFORMATION CONSTITUTE A WARRANTY, WHETHER EXPRESSED OR IMPLIED, AS TO THE SAFETY OF THE GOODS, THE MERCHANTABILITY OF THE GOODS, OR THE FITNESS OF THE GOODS FOR A PARTICULAR PURPOSE. Adjustment to conform to actual conditions of usage may be required. Seepage Control assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied.

End of Safety Data Sheet

Sapphire Project:
PR.090027.000

October 30 2009
Proposal 015297.PRO.0

Mr. Jaime Moreno
Sapphire Energy
27101 Puerta Real, Ste. 280
Mission Viejo, California 92691

Subject: **Proposal for Surveying and Aerial Photography Services**
Proposed Integrated Algal Biorefinery
Luna County, New Mexico

Dear Mr. Moreno:

At your request, AMEC Geomatrix, Inc. (AMEC), has prepared this proposal to provide surveying services in support of the proposed Integrated Algal Biorefinery (IABR) project in Luna County, New Mexico.

BACKGROUND

Sapphire Energy (Sapphire) is in the process of securing the Cooper property in Luna County, New Mexico to host their IABR project. The Cooper property is southwest of Columbus, New Mexico, near the international border between the United States and Mexico. The property is composed of western and eastern parcels separated by lands owned by the Bureau of Land Management. Total area of the Cooper property is approximately 2,200 acres. Sapphire proposes to construct an integrated algal biorefinery facility, which will include a series of shallow ponds, 1 to 2 feet deep, and processing facilities. Details of the facilities are not available at this time.

AMEC previously performed a due diligence assessment of the Cooper property on behalf of Sapphire. The results of the due diligence were documented in a report dated April 2009 and entitled, "Final due Diligence Assessment, Cooper Property, Luna County, New Mexico."

SCOPE OF SERVICES

Redacted Exemption 4

AMEC Geomatrix, Inc.
510 Superior Avenue, Suite 200
Newport Beach, CA
USA 92663-3627
Tel (949) 642-0245
Fax (949) 642-4474
www.amecgeomatrixinc.com

AMEC Geomatrix

11/2/09

DELIVERABLES

Project deliverables will include the following:

-
- Redacted Exemption 4
-
-
-
-

TIME SCHEDULE

Redacted Exemption 4

FEES

We propose to perform and complete the services outlined in this proposal and generate a Redacted Exemption 4 as shown in the cost summary presented in Table 1. The fees will be charged on Ex. 4 in accordance with our ~~current~~ negotiated Schedule of Charges and Conditions (attached).

Thank you for the opportunity to present this proposal. If you have any questions regarding the scope, schedule or cost of the services described herein, please do not hesitate to call the undersigned at (949) 642-0245.

Sincerely,
AMEC GEOMATRIX, INC.

Approved & Authorized

Jaime E. Moreno
Vice President
Sapphire Energy
November 2, 2009

(for)

James J. Weaver, PE, GE
Vice President and
Principal Geotechnical Engineer

Enclosures:
Table 1 - Cost Breakdown
Schedule of Charges and Conditions

11/2/09

TABLE 1

COST BREAKDOWN

Proposal for Surveying and Aerial Photography Services
Proposed Integrated Algal Biorefinery
Luna County, New Mexico

Proposal No.: 15297.PRO.0 Project Name: IABR Mapping | Date: 30-Oct-09 | Completed By: A. B.

Redacted Exemption 4

PROPOSED TOTAL COST: $ Redacted Exemption 4

11/2/09

AMEC GEOMATRIX, INC.
SCHEDULE OF CHARGES

Effective January 25, 2008

The Schedule of Charges applies to all services provided by and/or through AMEC Geomatrix. The schedule of charges may be revised periodically, as conditions require.

LABOR:

Labor charges are for technical work, including technical typing, editing, and graphics involved in the preparation of reports and correspondence and for the time associated with production of such documents. Direct charges are not made for secretarial service, office management, accounting, and maintenance, because these items are included in overhead. Labor category charge rates for AMEC Geomatrix, Inc. are listed below. Regional and other factors may influence rates charged for certain individuals. Rates for individuals will be provided on request.

LABOR CATEGORY	HOURLY RATE

Redacted Exemption 4

Time spent in travel in the interest of the client will be charged at hourly rates, except that no more than 8 hours of travel time will be charged in any day. When it is necessary for an employee to be away from the office overnight, actual costs, or a negotiated rate, will be charged for living expenses. Employee expenses will be charged at cost plus 15%.

Charges for expert witness services will be at the hourly rates shown. However, for depositions and for court appearances, the rate is twice the amount shown. There will be a 4-hour minimum per-day charge for depositions and an 8-hour minimum per-day charge for court appearances. Special accounting services will be billed at the Support Staff rate.

Redacted Exemption 4

OUTSIDE SERVICES:

Redacted Exemption 4

REIMBURSABLES:

Redacted Exemption 4

INVOICES:

Invoices will be rendered at least monthly, either as a final or partial billing, and will be payable upon receipt. An additional late payment charge of 1 1/2% per month or the maximum charge allowed by law, whichever is less, will be payable on accounts not paid within 30 days from billing date.

AMEC Geomatrix is an Equal Opportunity/Affirmative Action Employer, and as such adheres to all applicable federal, state, and local laws and regulations in this regard.

11/2/09

Redacted
Ex. 4

CONDITIONS:

AMEC will not be liable for damage or injury arising from damage to subterranean structures (pipes, tanks, telephone cables, etc.) which are not called to its attention and correctly shown on the plans furnished to it in connection with AMEC's work. Client will furnish right-of-entry and equipment access for AMEC to make borings, surveys, and/or explorations. While AMEC will operate with reasonable care not to damage property and plants, the cost of repairing any damage not reasonably avoidable is not included in the fee unless otherwise stated.

AMEC's services shall be performed in a manner consistent with that level of care and skill ordinarily exercised by other professional consultants performing comparable services under comparable circumstances at the time services are performed under this Agreement. No other representations to Client, express or implied, and no warranty or guarantee not expressly stated herein are included or intended in this Agreement. No statements contained in any report, opinion, document, or otherwise, whether prepared prior to, at the same time, or subsequent to this Agreement, constitute any warranty or guarantee by AMEC as to the services performed under this Agreement.

AMEC shall, to the fullest extent permitted by law, indemnify and hold harmless Client, its affiliates and their respective directors, officers, employees and agents from all claims and actions, losses and attorneys' fees ("Losses") arising from AMEC's negligence or intentional misconduct in the performance of services pursuant to this Agreement, but only to the extent AMEC's negligence or intentional misconduct caused such Losses. Client shall, to the fullest extent permitted by law, indemnify and hold harmless AMEC, its affiliates and their respective directors, officers, employees, agents and subcontractors from and against all Losses either (a) arising from Client's negligence or intentional misconduct or (b) based on, or arising out of, damages or injuries to persons or property caused by, or arising out of, any hazardous and/or toxic substances present at the site.

To the fullest extent permitted by law and notwithstanding anything in the preceding paragraph to the contrary, the total cumulative liability of AMEC and its affiliates and their respective directors, officers, employees, agents, and subcontractors to Client and all third parties with respect to services performed or to be performed pursuant to this Agreement, whether for breach of contract, warranty, indemnity, contribution, tort, design defect, or otherwise, shall not exceed 100% of the gross compensation actually received by AMEC under this Agreement or ~~$50,000~~, whichever is greater; provided however, for any damage caused by acts or omissions other than professional negligence, such liability shall not exceed the available coverage under AMEC's commercial general and automobile liability insurance coverage. Neither party shall be liable to the other party for special, incidental, consequential, or penal losses or damages, even if the parties have been advised of the possibility of such damages. The foregoing limitations shall apply to all actions of any character, whether in law or equity and whether sounding in contract, indemnity, contribution, warranty, tort, design defect, or otherwise. Client shall notify its contractors and their subcontractors of the foregoing limitations of liability and obtain, for the benefit of AMEC, their agreement to the foregoing limitations of liability.

Client shall have the right to use the materials resulting from AMEC's efforts on the project (the "Materials") only for purposes expressly contemplated in this Agreement. The Materials shall not be used by Client for other projects, for additions to the subject project, for any portions of the project following any termination of AMEC, or for completion of the project by others (unless AMEC is in material breach of this Agreement), except by agreement in writing. Client agrees to indemnify, defend, and hold harmless AMEC against all losses resulting from any use of the Materials not expressly authorized by this Agreement.

In the event of any dispute, action, or proceeding between Client and AMEC arising from this Agreement, the prevailing party shall be entitled to recover its reasonable attorneys' fees and expenses. Any action by Client against AMEC relating to services hereunder shall be brought not later than one year following the earlier of termination or completion of AMEC's services. In the event of a civil action between the Client and AMEC, the parties knowingly and willingly waive, to the fullest extent permitted by law, any right to a trial of such action by a jury.

AMEC and Client intend to submit disputes to alternative dispute resolution procedures. In the event of a dispute between AMEC and Client arising in connection with this Agreement, AMEC and Client shall make good faith efforts to agree on an alternative dispute resolution procedure to resolve the dispute. The cost of such procedure (excluding each party's attorneys' fees and expenses) shall be divided equally among the parties to the dispute.

All provisions under the heading "CONDITIONS" shall survive termination or completion of this Agreement.

Client INITIALS _____ AMEC _____

11/2/09

Harris Group Inc.

October 20, 2009

Jaime Moreno, P.E.
Sapphire Energy, Inc.
27101 Puerta Real
Suite 280
Mission Viejo, CA 92691

Sent via email to: jaime.moreno@sapphirefuel.com

Reference: **Sapphire Energy, Inc.**
Process Development and Cost Estimating
Proposal for Professional Services
Harris Group Project Number 42095.00.10
Sapphire Project Number PR.090023.100

Dear Jaime:

Thank you for the meeting last week with the Integrated Algal Biorefinery (IABR) team to discuss our path forward. Harris Group Inc. appreciates the opportunity to work with Sapphire Energy, Inc., in developing Sapphire's technology for production of hydrocarbon fuels from algae. Following is our proposal to develop a design basis and provide preliminary engineering leading to a class 25 cost estimate.

BACKGROUND

We understand that Sapphire Energy is developing technology to create hydrocarbon fuels through algae. The technology platform is vertically integrated and includes algae production, lipid extraction, and conversion of lipids to hydrocarbon fuels. Sapphire has built an IABR engineering team that includes Harris Group, Brown and Caldwell, and AMEC/Geomatrix. We understand that Sapphire intends for Harris Group to act as the lead in technology integration for the IABR.

APPROACH

The scope of services proposed for the class 25 cost estimate is as follows:

1.
2. Redacted Exemption 4
3.

4.

5.

Communications:
P.O. Box 3855
Seattle, WA 98124-3855
(206) 494-9400
Fax (206) 494-9500
www.harrisgroup.com

Office:
Suite 200
200 W Thomas St.
Seattle, WA
98119

6. Redacted Exemption 4

7.

8.

DESIGN BASIS DEVELOPMENT

Basic performance parameters of IABR operation will be developed as the requirements for other process and ancillary systems. Budgetary proposals for process systems for the core process technologies will be solicited and/or refined. The evaluations and selections of these core technologies will comprise the most critical activity of the design phase and will have the greatest influence on future activities. Major deliverables for this phase are

Redacted Exemption 4

PRELIMINARY ENGINEERING

The preliminary engineering phase will provide adequate detail to enable

Redacted Exemption 4

Harris Group understands that Sapphire plans to hold weekly project status meetings to coordinate current design activities among all disciplines, identify issues, and assure assignment of responsibility for their timely resolution. These meetings will also identify any exceptions to the approved plan and provide a short-term look-ahead for all project team members.

Our project controls department will prepare the capital cost estimate using the budgetary proposals and other design data from project team members. They will also

utilize Harris Group's historical data from other similar industrial projects and parametric estimating techniques where acceptable. The estimator will work closely with the project team members to build the estimate. Harris Group will prepare a checklist of likely capital costs, including indirects to review with the owner, and assure that no cost items are either overlooked or unintentionally included.

HARRIS GROUP DELIVERABLES

We anticipate the following list of deliverables for the process development/class 25-cost estimate phase of the project.

Project Management

- Redacted Exemption 4
-
-

Process

-
- Redacted Exemption 4
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-

-

- Redacted Exemption 4

Piping and Plant Layout

-
- Redacted Exemption 4
-

-

Mechanical

-
- Redacted Exemption 4
-

-

Civil /Structural

-
- Redacted Exemption 4
-

Electrical

-
- Redacted Exemption 4
-
-
-
-
-
-

Instrumentation

- Redacted Exemption 4

- Redacted Exemption 4

SCHEDULE

Harris Group understands that Sapphire's schedule requires the class 25 estimate to be complete by mid-February and can support that schedule.

FEE AND CONDITIONS

Harris Group proposes to perform this work on a Redacted Exemption 4 with our existing agreement (proposal PS069.00-02, dated January 23, 2009), with the scope and total authorization revised as outlined above. All other terms, including the Memorandum of Engagement and rate schedule, incorporated herein by reference, remain unchanged.

Based on past experience with similar projects, we estimate that this work will cost Ex. 4 . We will provide you with regular updates on our progress, and we will notify you if we anticipate any deviation from this estimate. A retainer of $Ex.4 is required to initiate work. This sum will be held by Harris Group during execution of the work and applied against the final invoice. A breakdown of the work by category is as follows:

Category	Hours	Costs
Redacted Exemption 4		

Harris Group proposes to perform this work in accordance with our mutually agreed Memorandum of Engagement, dated January 23, 2009, attached hereto as Exhibit B and incorporated herein by reference. Upon your decision to proceed, please sign the acceptance of the above terms at the end of this proposal and return to us with your

purchase order via fax at (206) 494-9500. We will begin work upon receipt of these documents and the retainer. This proposal is valid for 30 days.

It will be our pleasure to work with Sapphire Energy in developing its algae-to-fuels technology, and we appreciate your confidence in Harris Group. We look forward to discussing this proposal with you.

Very truly yours,

Mark E. Warner, P.E.
Vice President, Forest Industries and Process Solutions

MEW/mmw

Attachments: Rate Schedule PS209, Memorandum of Engagement dated January 23, 2009

cc: John Logsdon, Doug Dudgeon, File 42095.00.0103

Approved and Accepted by:

Sapphire Energy, Inc.

Jaime E. Moreno
Signature

10/23/09
Date

Jaime E. Moreno, Vice President
Name, Title (Print or Type)

Initial Here _____

GENERAL CONDITIONS
MEMORANDUM OF ENGAGEMENT FOR PROFESSIONAL SERVICES
HARRIS GROUP INC.

Attachment to and part of Letter, Proposal, or Agreement dated: January 23, 2009
Client: Sapphire Energy, Inc.
Project: Process Development and Cost Estimating

All professional services provided by HARRIS GROUP INC. ("Harris Group") are subject to the terms and conditions set forth in this Memorandum of Engagement unless and only to the extent expressly modified in writing and signed by Harris Group and Client. The parties acknowledge that from time to time forms containing printed terms and conditions inconsistent with the terms and conditions of this Memorandum of Engagement may be used and that such preprinted terms and conditions are not intended to, and will not apply to the services covered by this Memorandum of Engagement.

1. Personnel. Harris Group shall furnish the personnel required to perform the services covered by this Memorandum of Engagement ("the Services") and shall engage any other professional parties as it deems necessary for the performance of the Services.

2. Facilities and Equipment. Harris Group shall provide office space and customary office equipment and facilities at the offices of Harris Group for its own staff. Unless otherwise agreed in writing between the parties.

3. Instructions and Approvals. Harris Group shall cooperate fully with Client in providing the Services. Client shall name an authorized representative at or before the start of the work who shall be responsible for providing information, instructions, and approvals on Client's behalf. Such representative shall be available to Harris Group at all reasonable times. Client shall be responsible for all delays in performance of the Services caused by or arising out of Client's unavailability or its failure to provide information, instructions, or approvals timely.

4. Terms of Payment. Invoices shall be issued by Harris Group as set forth in its Rate Schedule then in effect and shall be due and payable on presentation. Invoices not paid within thirty (30) days of invoice date may be carried forward to the next invoice date and shall be subject to a carrying charge of 1.5 percent per month. If Client fails to pay any invoice as agreed, Harris Group shall have the right to terminate this Memorandum of Engagement immediately. The right to terminate under the terms of this paragraph shall be in addition to all other legal, equitable or contractual remedies available to Harris Group. Client shall have no right of setoff against any billings of Harris Group for disputed claims.

5. Differing Conditions. Harris Group shall be entitled to rely on the accuracy and completeness of all testing, services, reports, data, and other information furnished by Client regarding the project or the site. If Harris Group believes that any condition encountered at the site or during the course of the project is inaccurate or differs materially from the indicated, reflected or referred to by Client, its representative(s), employees, or consultants at the time of Harris Group's proposal, Harris Group shall notify Client within a reasonable time. Such differing conditions such as subsurface conditions or underground utilities; condition of existing structures; and the presence of asbestos or any substance or material categorized as hazardous or toxic by federal, state or local laws and regulations. Harris Group shall not be required to continue performing the Services until such time as Client and Harris Group have mutually agreed to a change in compensation, time for performance, and/or other resolution of the differing condition.

6. Changes. In addition to the change in compensation and/or time for performance referred to in paragraph 5 above, Harris Group shall be entitled to an increase in compensation and/or time for performance for any other changes to be made in the scope of the Services to the extent such changes do not arise from the negligence of Harris Group. Harris Group shall be required to give notice to Client that it intends to seek additional time or compensation within a reasonable time after the change has been requested. Harris Group shall not be required to perform any work connected with a change unless the parties have agreed on the amount of or the basis for calculating the time and/or compensation associated with the change.

7. Delays. Harris Group shall be entitled to prompt written notice by Client, and additional time and/or compensation for delays caused by or resulting from acts of Client, contractors, subcontractors, suppliers, or other third parties over whom Harris Group has no direction or control to the extent the delay(s) are not caused by Harris Group's negligence.

8. Insurance. Harris Group at its own expense, carries professional liability, workers' compensation and employer's liability coverage as required by applicable state law, and general liability insurance (including automobile liability). The amount of insurance available may vary from year to year. The professional liability insurance is written on a claims-made basis.

9. Standard of Care. Harris Group represents and agrees that its Services shall be performed in accordance with locally recognized engineering codes and standards and sound industry practices prevailing at the time of performance that are followed by professional engineers performing similar Services under similar conditions. Harris Group's liability for failing to meet the above referenced standard of care in any of Harris Group's Services shall be limited to the re-performance of such substandard Services to the extent that they arise out of the negligence of Harris Group. Such re-performance of Services shall be at no cost to Client, provided that Harris Group is notified by Client in writing of Harris Group's negligently performed Services within one year of Harris Group's completion of Services; and such notice shall specifically include a request for re-performance.

10. Indemnity. Harris Group agrees to indemnify and hold harmless Client from and against any and all liabilities, claims, penalties suits, and the cost and expense incident thereto which Client may hereinafter incur as a result of death or bodily injuries to any person or the destruction or damage to property to the extent caused solely by the negligent act, negligent omission or willful misconduct of Harris Group employees. In no event shall Harris Group be liable or responsible for special or consequential damages for claims, disputes, or other matters arising out of or relating to this Memorandum of Engagement, that exceeds three (3) times the amount of fees paid to Harris Group under this Memorandum of Engagement.

11. Performance by Contractors, Subcontractors and Suppliers. Harris Group shall not be required to make exhaustive, extensive, or continuous on-site inspections of the work except to the extent that such inspections are expressly specified in the description of the scope of the Services to be undertaken by Harris Group. No acceptance or approval by Harris Group of the work of contractors, subcontractors or suppliers shall excuse them of their obligations to Client for the proper performance of their work.

12. Construction Means and Safety. Client hereby expressly agrees that Harris Group shall assume no responsibility for control or right of control over any contractor, subcontractor or supplier, their agents, employees or others for whom they may be liable in connection with the means, methods, techniques, sequences, procedures and equipment used or not used by such contractors, subcontractors, or suppliers in their performance of any phase of the work, for placing into operation any plant or equipment, or for any safety precautions or programs related thereto. Responsibility and control for all such activities shall be solely and exclusively that of Client, such contractors, subcontractors, and suppliers.

13. Ownership of Documents. All designs, drawings, specifications, notes, data, samples, materials, report reproducibles and other work developed by Harris Group are "instruments of service" and after payment shall therefore become the property of the Client. Client agrees not to use, reuse, or adapt any work product developed by Harris Group for the specific project or application intended if Harris Group's services have been terminated prior to completion, unless agreement has been reached for such further use. Client shall defend, indemnify and hold harmless Harris Group Inc. from all claims, losses, liabilities, damages, expenses, and costs arising out of the unauthorized use or reuse of such work product by Client or agents of Client.

14. Costs and Attorneys' Fees. If either party under this Memorandum of Engagement makes any claim, the prevailing party shall be entitled to its costs and reasonable attorneys' fees at trial and on appeal.

15. Termination. Client and Harris Group have the right at any time to terminate this Memorandum of Engagement by giving five (5) days' written notice to the other party. If Harris Group is terminated for any reason other than a material breach of the terms and conditions of this Memorandum of Engagement, Client shall be responsible for payment of all reasonable demobilization costs, all expenses incurred or obligated at the date of termination, including the proportionate share of any Harris Group fee applicable to the Services performed through the date of termination.

16. Third-Party Beneficiaries. Nothing in this Memorandum of Engagement shall be interpreted or construed as giving any rights or benefits to anyone other than Harris Group and Client unless such third party has been expressly designated as a third-party beneficiary in this Memorandum of Engagement.

17. Governing Law and Severability. Washington law shall govern this Memorandum of Engagement unless otherwise provided. If any term, condition or provision of this Memorandum of Engagement or the application thereof to any circumstances is determined to be invalid or unenforceable to any extent, the remaining provisions of this Memorandum of Engagement shall not be affected but shall instead remain valid and fully enforceable.

18. Waivers. No waiver by either party of any default by the other will operate as, or be construed as, a waiver of any future default, whether like or different in character.

19. Headings. The headings used in this Memorandum of Engagement are for convenience and reference purposes only and are not to be used in interpreting or construing the substantive provisions of the Memorandum.

RATE SCHEDULE

PROFESSIONAL, TECHNICAL, AND PROJECT STAFF

Services performed by Harris Group Inc. shall be compensated at the following hourly billing rates:

Position*	Billing Rate**	Position*	Billing Rate

Redacted Exemption 4

* Based on National Society of Professional Engineers (NSPE) position descriptions as edited by Harris Group Inc.

** All rates are shown in U.S. dollars

Certain individuals with special expertise may be charged out at a rate independent of the Rate Schedule.

TECHNOLOGY EXPENSES

The following technology expenses shall be billed at $ Redacted Exemption 4

- Redacted Exemption 4
-
-
-

TRAVEL EXPENSES

Redacted Exemption 4

OTHER EXPENSES

The following expenses shall be billed at Redacted Exemption 4

- Redacted Exemption 4
-
-
-

INVOICING PROCEDURE

Unless otherwise arranged, charges will be billed every two weeks, accompanied by a summary of time spent by each staff member on the project, along with related direct charges. Invoices are due and payable on presentation. Invoices not paid within thirty (30) days shall accrue interest, until paid, at the lesser of 1.5% per month or the highest rate permitted by law.

This rate sheet is subject to adjustment on December 31, 2009.

PS209

Autodesk

Project No. PR.090023.000.01
Received By D. MARSH Date 2/5/2010
Approved By Date 2/5/10

INVOICE

Invoice No. 9052240729
Invoice Date 01/08/2010
Due Date 02/07/2010
Page No: 1 of 1

Invoice To:
SAPPHIRE ENERGY
Attn: Nick Herrera
3115 Merryfield Row
San Diego CA 92121-1125

Deliver To:
SAPPHIRE ENERGY
3115 Merryfield Row
San Diego CA 92121-1125

Purchase Order #:	901302	Order Number	Quotation Number	Reference Number	Account Number
Ship Date:	01/08/2010				
Ship Via:	FEDEX GROUND	7052033050			5104866946
Shipping Terms:	FOB Origin	Payment Terms:	30 Days		

Material Number	Description / Serial Numbers	# of Seats	Qty	Unit Price	Extended Price
	Redacted Exemption 4				
	# O.C. Dave Marsh				

Autodesk Reseller: Redacted Exemption 4

Subtotal	Redacted Exemption 4
Tax	
Freight	
Amount Due USD	

Redacted Exemption 4

Redacted Exemption 4

Invoice No. CEC 2010-01
Invoice Date January 12, 2010

Name Sapphire Energy, Inc.
Address 27101 Puerta Real, Suite 280
Mission Viejo, CA 92691-8009
Attn: Dave Marsh, P.Eng.

Units	Description	Unit Price	Amount
	Redacted Exemption 4		
			Redacted Exemption 4

Project No. PR.10001.000
Received By D.MARSH Date JAN 12 2010
Approved By Date

Status: (Office Use Only)
Payment Date
Amount
Balance

Acct. No. 107.20 WO# 30005

201 North Civic Drive, Suite 115
Walnut Creek, California 94596-3864

Tel: 925.937.9010
Fax: 925.937.9026

www.brownandcaldwell.com

PR. 10 0007. 100

February 5, 2010

BROWN AND CALDWELL

Mr. Jaime Moreno
Sapphire Energy, Inc.
27101 Puerta Real, Suite 280
Mission Viejo, California 92691

071767.003.001

Subject: Proposal and Letter Agreement to Assist with IABR Redacted Exemption 4

Dear Mr. Moreno:

Sapphire Energy, Inc., (Sapphire) is developing technologies to grow algae in open ponds and convert algal biomass to fuel. Sapphire plans to build a demonstration plant – the Integrated Algal Bio Refinery (IABR) – in Columbus, New Mexico. Brown and Caldwell (BC) has been assisting with the conceptual design and cost estimation of portions of the IABR. In this letter proposal, we present our proposal to assist Sapphire and Harris Group, Inc., with a Redacted Exemption 4

Scope of Work

BC will perform the following:

Phase 307 — Redacted Exemption 4

Redacted Exemption 4

Compensation

Table 1 shows our proposed budget for this work. We will perform this work under the Terms and Conditions of our agreement with Sapphire dated February 27, 2009.

Table 1. Proposed Budget for Nutrient Recycle Evaluation (Phase 307)				
Task	Hours	Labor	Expense	Total
Redacted Exemption 4				

To accept this proposal, please sign and date two copies and return one copy to BC within 10 days.

Please contact Matt Gerhardt at 925.210.2275 with any questions on this proposal.

Very truly yours,

BROWN AND CALDWELL

Matthew B. Gerhardt, Ph.D., P.E.
Managing Engineer

Jay Patil
Senior Vice President

MBG:jmv

The undersigned agrees to the Terms and Conditions of this Letter Agreement attached hereto

SAPPHIRE ENERGY, INC.

Signature: _____

Printed Name: Jaime E. Moreno

Title: Vice President

Date: 2/17/10

cc: Dr. Alex Aravanis, Sapphire Energy, Inc.
Dr. Carla De Las Casas, Brown and Caldwell
Dr. Melih Ozbilgin, Brown and Caldwell
Mr. Bryan Plude, Brown and Caldwell

Note: The information contained in this proposal is proprietary and contains confidential information that is of significant economic value to Brown and Caldwell. It is intended to be used only for evaluation of our qualifications to provide services. It should not be duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate this proposal.

ADDENDUM TO AGREEMENT FOR PROFESSIONAL SERVICES
WORK ORDER NO. 04
SAPPHIRE PROJECT NO. PR. 10020.100
AMEC GEOMATRIX PROJECT NO. 14821.004

AMEC Geomatrix, Inc. is hereby authorized to perform the following work (the "Work") pursuant to the Agreement for Professional Services previously executed between AMEC Geomatrix, Inc. ("AMEC"), and Sapphire Energy Company ("CLIENT") dated February 2, 2009.

CLIENT NAME:	Sapphire Energy Company
PROJECT NAME:	Spring 2010 Biological Assessment (Burrowing Owl and Aplomado Falcon Surveys)
PROJECT LOCATION:	Proposed IABR Facility Location – Luna County, New Mexico.
DESCRIP. OF WORK:	Two biological surveys will be completed at the proposed IABR facility in Luna Count to meet the general requirements stipulated in the Endangered Species Act (ESA) and the Migratory Bird Treaty Act (MTBA); compliance with these acts is a requirement of the FONSI associated with the USDA Environmental Assessment. Data and analyses from these efforts will be provided to the U.S. Fish and Wildlife Service (USFWS) and the New Mexico Department of Game and Fish (NMGF), the agencies that are responsible for administering the ESA and MTBA. The Scope of Work for this effort is outlined in **Attach. A**.
PERIOD OF SERVICE:	March 1, 2010 through June 30, 2010.
PAYMENT:	Payment to be made in accordance with the Agreement for Services between AMEC Geomatrix and CLIENT, dated February 2, 2009. The estimated cost to provide the services outlined in **Attachment A** is **$** Ex. 4 This budget will not be exceeded without prior authorization from CLIENT. **Attach. B** summarizes estimated costs to complete this Work Order.

OTHER TERMS AND CONDITIONS: Work to be performed in accordance with the Terms and Conditions stated in an Agreement for Services between AMEC and CLIENT, dated February 2, 2009.

AMEC GEOMATRIX, INC.

By: _____
Unit Manager
(Authorized Representative)

Printed Name: Myles F. Grotbo

Date: March 2, 2010

Send copies of communications and notices to
AMEC Geomatrix: Attn: Myles Grotbo

SAPPHIRE ENERGY COMPANY

By: _____
(Authorized Representative)

Printed Name: Jaime Moreno

Date: 3/10/2010

Send copies of communications and notices to
Sapphire Energy: Attn: Jaime Moreno

Attachment A

STATEMENT OF WORK
SPRING 2010 BIOLOGICAL ASSESSMENT
COOPER PROPERTY
LUNA COUNTY, NEW MEXICO

SAPPHIRE PROJECT NO. PR. 100020.100

Prepared for:

Sapphire Energy Company
3115 Merryfield Row
San Diego, CA 92121

Prepared by:

AMEC Geomatrix, Inc.
1824 North Last Chance Gulch
Helena, Montana 59601
Contact: Myles Grotbo
Email: myles.grotbo@amec.com
Ph: (406) 442-0860

AMEC Geomatrix

March 2010

PROJECT OBJECTIVES

According to stipulations in the Finding of No Significant Impact (FONSI) for the 2009 Environmental Assessment and supporting communications prepared for the US Department of Agriculture, Sapphire Energy (Sapphire) is required to conduct a spring 2010 biological survey for the burrowing owl and the Aplomado falcon at the proposed IABR facility location in Luna County, New Mexico. The survey is being performed to meet general requirements in the Endangered Species Act (ESA) and the Migratory Bird Treaty Act (MTBA) and will serve to provide data to the U.S. Fish and Wildlife Service (USFWS) and the New Mexico Department of Game and Fish (NMGF) for those agencies to discharge their responsibilities regarding protection of habitat and bird species that may use the IABR site.

APPROACH

To satisfy requirements in the USFWS's guidance for field study of the Burrowing Owl, AMEC Geomatrix anticipates conducting two separate field study events to assess burrowing owl presence and habitat; one in mid-March and one in mid-April 2010. Upon completion of these studies, the data gathered will

Redacted Exemption 4

The following tasks will be completed to achieve the study objectives.

Task 1 – Conduct Field Surveys

Redacted Exemption 4 will mobilize to the proposed IABR site on two occasions; once in mid-March and once in mid-April to conduct the field surveys. Each field survey will

Redacted Exemption 4

Task 2 – Prepare Technical Memorandum

After completion of the March field survey event, AMEC Geomatrix personnel will prepare a brief technical memorandum that describes the survey results of this initial event. This technical memorandum will

Redacted Exemption 4

SCHEDULE

The approximate schedule to complete the tasks described above is as follows:

- Task 1 (Conduct Site Surveys) – The survey events will
  Redacted Exemption 4
- Task 2 (Prepare Technical Memorandums) -- A draft technical memorandum will be completed

Redacted Exemption 4

BUDGET

Attachment B summarizes the budget necessary to complete the scope of services described above.

ATTACHMENT B				
ESTIMATED COSTS; GMX Work Order No. 04				
Spring 2010 Burrowing Owl and Aplomado Falcon Surveys (March and April Events)				
March 2, 2010				
Task 1: Complete Field Surveys (March and April 2010)				
Redacted Exemption 4				
Task 2: Prepare Technical Memorandums				
Redacted Exemption 4				
			TOTAL LABOR AND DIRECT COSTS	Redacted Exemption 4
			New Mexico Gross Rec. Tax	
			GRAND TOTAL	

February 5, 2010 – **REVISED**

15297.PRO.0

Mr. Jaime Moreno
Sapphire Energy
3115 Merryfield Row
San Diego, California 92121

Subject: Revised Proposal for Geotechnical and Hydrogeologic Services
Proposed Integrated Algal Biorefinery
Luna County, New Mexico

Dear Mr. Moreno:

Based on a meeting with you on January 27, 2010, AMEC Geomatrix, Inc. (AMEC) has revised our proposal to provide geotechnical services in support of the proposed Integrated Algal Biorefinery (IABR) project in Luna County, New Mexico. AMEC provided you a proposal dated November 3, 2009 that included a scope and costs for a geotechnical investigation and limited hydrogeologic evaluation for the IABR project. We have revised our proposal as follows:

1.
2. Redacted Exemption 4

We look forward to providing you timely advice and recommendations for preliminary design of the project.

1.0 BACKGROUND

Sapphire Energy (Sapphire) is in the process of securing the Cooper property in Luna County, New Mexico to host their IABR project. The Cooper property is southwest of Columbus, NM near the international border between the United States and Mexico. The property consists of western and eastern parcels separated by lands owned by the Bureau of Land Management. Total area of the Cooper property is approximately 2,200 acres. Sapphire proposes to construct an integrated algal biorefinery facility on the western parcels, which measure approximately 920 acres. The IABR will include a series of shallow ponds, one to two feet deep, and processing facilities. Specific details of the facilities are not available at this time.

AMEC Geomatrix, Inc.
510 Superior Avenue, Suite 200
Newport Beach, CA
USA 92663-3627
Tel (949) 642-0245
Fax (949) 642-4474
www.amecgeomatrixinc.com

AMEC Geomatrix

AMEC previously performed a due diligence assessment of the Cooper property on behalf of Sapphire. The results of the due diligence assessment were documented in a report dated April 2009 and entitled, "Final due Diligence Assessment, Cooper Property, Luna County, New Mexico." The scope of work described below will be in support of the IABR development on the 920-acre western parcels.

2.0 SCOPE OF SERVICES

We will provide the necessary personnel, equipment, and materials to

Redacted Exemption 4

2.1 Task 1 - Redacted Exemption 4

Redacted Exemption 4

2.2 Task 2 – Redacted Exemption 4

Redacted Exemption 4

- Redacted Exemption 4

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2.3 Task 3 - Redacted Exemption 4

Redacted Exemption 4

Type	Designation	Maximum Number of Tests

Redacted Exemption 4

2.4 Task 4 – Redacted Exemption 4

Redacted Exemption 4

To fulfill these objectives, AMEC proposes to

Redacted Exemption 4

Redacted Exemption 4

Redacted Exemption 4

2.5 Task 5 – Analyses and Report

Redacted Exemption 4

Redacted Exemption 4

3.0 TIME SCHEDULE

Upon your authorization to proceed with the Geotechnical Investigation, we will commence

Redacted Exemption 4

4.0 FEES

We propose to perform and complete the geotechnical investigation outlined in this proposal for

Redacted Exemption 4

Thank you for the opportunity to present this proposal. If you have any questions regarding the scope, schedule or cost of the services described herein, please do not hesitate to call either Tim Keuscher or Jay Weaver at (949) 642-0245.

Sincerely,
AMEC Geomatrix, Inc.

James J. Weaver
Vice President and Principal Geotechnical Engineer

Enclosures:
Table 1 – Cost Breakdown for Geotechnical Investigation

TABLE 1
COST BREAKDOWN FOR GEOTECHNICAL INVESTIGATION

Proposal No.: 15297.PRO.0 Project Name: IABR Date: 4-Feb-10 Completed By: TCK

Estimated Task Hours

Redacted Exemption 4

PROPOSED TOTAL COST: $

February 25, 2010
15547.PRO.0

Mr. Jaime Moreno
Sapphire Energy
3115 Merryfield Row
San Diego, California 92121

Subject: **Proposal for Liner Pilot Test Study**
Proposed Integrated Algal Biorefinery
Luna County, New Mexico

Dear Mr. Moreno:

Per your request, AMEC Geomatrix, Inc. (AMEC) has prepared this proposal to design and oversee a pilot test study for the proposed Redacted Exemption 4 at the Integrated Algal Biorefinery (IABR) facility. We look forward to providing you timely advice, design, and oversight of the liner pilot test study.

1.0 BACKGROUND

Sapphire Energy (Sapphire) is in the process of securing the Cooper property in Luna County, New Mexico to host their IABR project. The Cooper property is southwest of Columbus, NM near the international border between the United States and Mexico. The property consists of western and eastern parcels separated by lands owned by the Bureau of Land Management. Total area of the Cooper property is approximately 2,200 acres. Sapphire proposes to construct an integrated algal biorefinery facility on the western parcels, which measure approximately 920 acres. The IABR will include a series of shallow ponds, one to two feet deep, and processing facilities. Specific details of the ponds are not available at this time. However, we understand that the ponds could be approximately 150 to 300 acres in size at the site.

AMEC understands that the New Mexico Environmental Department (NMED) wants the ponds to be lined and is amendable to different liner technologies and construction techniques. NMED may also be agreeable to

Redacted Exemption 4

AMEC previously performed a due diligence assessment of the Cooper property on behalf of Sapphire. The results of the due diligence assessment were documented in a report to Sapphire dated April 2009 and entitled, "Final due Diligence Assessment, Cooper Property, Luna County, New Mexico." AMEC also prepared a revised proposal dated February 5, 2010 that includes a geotechnical investigation and limited hydrogeologic evaluation in support of the IABR development on the 920-acre western parcels. Some results of the geotechnical investigation have particular relevance to the liner pilot test study.

AMEC Geomatrix, Inc.
510 Superior Avenue, Suite 200
Newport Beach, CA
USA 92663-3627
Tel (949) 642-0245
Fax (949) 642-4474
www.amecgeomatrixinc.com

2.0 SCOPE OF SERVICES

Based on our understanding of the project, our scope of geotechnical services will include the tasks described below.

2.1 Task 1 – Redacted Exemption 4

Redacted Exemption 4

Redacted Exemption 4

Redacted Exemption 4

2.2 Task 2 – Redacted Exemption 4

Redacted Exemption 4

2.3 Task 3 – Redacted Exemption 4

Redacted Exemption 4

2.4 Task 4 - Redacted Exemption 4

Redacted Exemption 4

Type	Designation	Maximum Number of Tests

Redacted Exemption 4

Redacted Exemption 4

2.5 Task 5 – Analyses and Report

Redacted Exemption 4

3.0 TIME SCHEDULE

The pilot test study should be performed in the same area where the full-scale ponds will be constructed. The actual location of the full-scale ponds within the facility site is uncertain at this

time and should be determined based on Redacted Exemption 4
Consequently, we believe the scope of work herein for the pilot study should begin immediately after the location of the full-scale ponds has been sited. Upon siting the ponds and your authorization to proceed, we will then begin development of the conceptual pilot test study. The time schedule to complete the tasks proposed herein is estimated below:

Redacted Exemption 4

4.0 FEES

We propose to perform and complete AMEC's portion of the pilot test study as outlined in this proposal for a not-to-exceed fee of $ Ex. 4 as shown in the cost summary presented in Table 1. The fees will be charged on a

Redacted Exemption 4

AMEC Geomatrix:	$
Redacted Exemption 4	
Earthwork Contractor:	
Earthwork	$
Well Pump/Piping	-
Total ROM Cost for Liner Pilot Study:	**$**

Thank you for the opportunity to present this proposal. If you have any questions regarding the scope, schedule or cost of the services described herein, please do not hesitate to call either Tim Keuscher or Jay Weaver at (949) 642-0245.

Sincerely,
AMEC Geomatrix, Inc.

Timothy C. Keuscher
Principal Geotechnical Engineer

James J. Weaver
Vice President and
Principal Geotechnical Engineer

Enclosures:
Table 1 – AMEC Cost Breakdown for Liner Pilot Test Study

TABLE 1
COST BREAKDOWN FOR GEOTECHNICAL INVESTIGATION

Proposal No.: 15297.PRO.0 Project Name: IABR Date: 4-Feb-10 Completed By: TCK

Estimated Task Hours

Redacted Exemption 4

PROPOSED TOTAL COST: $

IABR

ASTM E2516-06 Redacted Exemption 4

INCLUDES BROWN & CALDWELL ESTIMATE INPUT AND UPDATES

SAPPHIRE
COLUMBUS, NEW MEXICO
ESTIMATE OF COST

DATE: 22-Feb-10
BY: MW/msf
HGI #: 09-42095.03
Revision: 3/3/10 1:35 PM

Harris Group Inc.

Sequence #	Area	System	Category	WBS	DESCRIPTION	MATERIAL QTY	MATERIAL UNIT	MATERIAL UNIT PRICE	MATERIAL OWNER FURN. TOTAL	MATERIAL CONTR. FURN TOTAL	CONTRACTOR LABOR L.H. UNIT	CONTRACTOR LABOR LABOR HOURS	CONTRACTOR LABOR RATE	CONTRACTOR LABOR TOTAL	SUBCONTR TOTAL (Lab & Mat)	GRAND TOTAL
					SUMMARY BY WORK CATEGORY	**% of Direct**										
			bc													
			1													
			2b													
			2e													
			3													
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			7													
			8													

Redacted Exemption 4

1																

From: Dudgeon, Doug
Sent: Wednesday, March 10, 2010 3:18 PM
To: Jaime Moreno (jaime.moreno@sapphireenergy.com); Alex Aravanis (alex.aravanis@sapphireenergy.com); Richard Cranford (Richard.Cranford@sapphireenergy.com); Dave Marsh (dave.marsh@sapphireenergy.com)
Cc: Redacted Exemption 4
Subject: PDU options, schedule & cost (42095.02.1710, .1720, .2400)
Importance: High

…

Installed cost of the PDU as currently envisioned is estimated at $ Ex. 4 . This includes all the peripherals, such as Redacted Exemption 4

Engineering of the PDU as currently envisioned is estimated at $ Ex. 4 **.** This includes the following:

-
-
- Redacted Exemption 4
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Support for installation, commissioning, start-up, and test plan execution is estimated at $ Ex. 4 **.** This includes the following:

-
- Redacted Exemption 4
-
-

I know you wanted to discuss this today. I apologize for the delay in getting to you. We can be available to review with you at 4 p.m. this afternoon.

Kind regards,
Doug

ATTACHMENT B
BUDGET ESTIMATE; Work Order No. 5
Permitting Support Services
April 19, 2010

Task 1: Prepare Necessary Federal Permit Applications, Consultations

Redacted Exemption 4

Task 2: Prepare Necessary State Permit Applications

Redacted Exemption 4

BUDGET ESTIMATE; Work Order No. 5
Permitting Support Services
April 19, 2010

Task 3: Prepare Necessary Local Permit Applications
Redacted Exemption 4

Task 4: Provide Construction Oversight of Test Pond Construction and Operation
Redacted Exemption 4

BUDGET ESTIMATE; Work Order No. 5				
Permitting Support Services				
April 19, 2010				
Task 5: Provide Admin Support; Attend Project Meetings (8 months thru end of 2010)				
Redacted Exemption 4				
Task 6: Complete Other Tasks, as Assigned				
Redacted Exemption 4				
			TOTAL BUDGET	Ex. 4

201 North Civic Drive, Suite 115
Walnut Creek, California 94596-3864

Tel: 925.937.9010
Fax: 925.937.9026

www.brownandcaldwell.com

April 21, 2010

Brown AND Caldwell

Mr. Jaime Moreno
Sapphire Energy, Inc.
27101 Puerta Real, Suite 280
Mission Viejo, California 92691

071767.003.010

Subject: Proposal for Design Services In Support of IABR Development

Dear Mr. Moreno:

Sapphire Energy, Inc., (Sapphire) plans to construct an Integrated Algal Bio Refinery (IABR) in Columbus, New Mexico, to grow algae and convert algal biomass to fuel. Brown and Caldwell (BC) has produced preliminary designs and cost estimates for portions of the IABR. This proposal presents our scope, schedule and budget for continuing design services.

Background and Approach

Sapphire has committed to completing an engineering package in

Redacted Exemption 4

Table 1 shows our estimate of the number of drawings in each submittal. The values are

Redacted Exemption 4

Table 1. Estimated Number of Drawings		
Submittal	**Drawing Type**	**Number**
Redacted Exemption 4		

Additional drawings will likely be needed; therefore, we have included a contingency phase that includes budget for another Redacted Exemption 4

Scope of Work

Brown and Caldwell will perform the following tasks. Because the State of New Mexico imposes a gross receipts tax on engineering consultants, we must track work done in New Mexico (NM) separately; therefore, each phase for which work will be done both in-state and out-of-state has two separate numbers.

Redacted Exemption 4

Redacted Exemption 4

Compensation

BC will conduct this work on a Redacted Exemption 4 in Table 2.

Table 2. Estimated Level of Effort and Fee IABR Design						
Phase[a]	Description	Hours	Cost			Total
			Labor	APC	Other Expenses	
			Redacted Exemption 4			

[a]*Where two numbers are shown, the second is for activities performed within New Mexico, which must be tracked separately for state tax purposes.*
[b]*Tax rate = 5 percent on applicable items*

Labor will be charged in accordance with the attached Schedule of Hourly Billing Rates. Expenses will be billed at Redacted Exemption 4

Scope and Budget Assumptions

Assuming we receive written authorization to proceed by Redacted Exemption 4

Scope and Budget Assumptions

1. Redacted Exemption 4

2.

3. Redacted Exemption 4

4.

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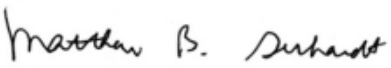
15.

To accept this proposal, please sign and date two copies and return one copy to BC within five days.

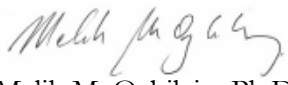
We look forward to working with you in the IABR design. Please contact Matt Gerhardt at 925.210.2275 with any questions on this proposal.

Very truly yours,

BROWN AND CALDWELL



Matthew B. Gerhardt, Ph.D., P.E.
Managing Engineer



Melih M. Ozbilgin, Ph.D.
Vice President

MBG:

The undersigned agrees to the Terms and Conditions of this Letter Agreement attached hereto

SAPPHIRE ENERGY, INC.

Signature:_____

Printed
Name:_____

Title: _____

Date: _____

cc: Ms. Jenelle Armstrong, Brown and Caldwell
Dr. Carla De Las Casas, Brown and Caldwell
Mr. Robert Finn, Brown and Caldwell
Mr. Bryan Plude, Brown and Caldwell

April 23, 2010

Mr. Jaime Moreno
Vice President of Projects
Sapphire Energy, Inc.
27101 Puerta Real, Suite 280
Mission Viejo, CA 92691

Sent via email to: jaime.moreno@sapphireenergy.com

Reference: Sapphire Energy, Inc.
IABR Detailed Design
Proposal for Professional Services
HGI Proposal No. PI610.01-11, Rev 1

Dear Jaime,

We are pleased to provide you with this proposal for engineering services for your proposed integrated algal bio-refinery (IABR) in Columbus, New Mexico. We have appreciated the opportunity to provide project development services for the IABR and believe we are uniquely qualified for the detailed design.

Project Description
Sapphire Energy plans to scale up its process for cultivating and harvesting algal biomass, extracting oil from the algae, and converting those oils into liquid transportation fuels. Sapphire has developed its own process for growing and harvesting algae, and recovering algal oil from the harvested biomass. Conversion of these oils into liquid fuels will be accomplished using Syntroleum's Bio-Synfining™ process. Each facility will consist of the following major process areas: algae growth and harvesting; algae oil extraction and purification; Syntroleum Bio-Synfining™; and auxiliary equipment.

The IABR facility will be built at demonstration scale (91 bbl refined algae oil/day). In the demonstration-scale facility, algae will be grown, harvested, and extracted using a process developed by Sapphire. Extracted oil will be stockpiled at Sapphire's site and then shipped to the Dynamic Fuels refinery, where it will be converted into green diesel and green jet fuels using the Syntroleum process. Spent solids left over after the extraction process will be fed to an anaerobic digester. Biogas from the digester will be collected and combusted to supply a portion of the heat and CO_2 needed for the process. In the commercial-scale facility, all unit operations will take place on one site and be owned and operated by Sapphire.

Sapphire is currently utilizing both Harris Group (HGI) and Brown and Caldwell (B&C) for engineering scopes of work. Responsibilities are delineated as follows:

Area	Name	Operations	Responsible Engineer
00	Redacted Exemption 4		HGI
			HGI
			HGI
			HGI
			HGI
			HGI
			HGI
01			HGI
			B&C
			HGI/B&C
			B&C
02			B&C
			B&C
			B&C
03			B&C
04			HGI
			HGI
			HGI
05			N/A
06			Dynamic
07			B&C
			HGI
			B&C
08			B&C
			B&C
09			HGI
			HGI
			HGI
			HGI
			HGI
			HGI
			HGI
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			HGI
			HGI
			HGI

Engineering Scope of Work
HGI proposes to provide the engineering design necessary for the construction of the IABR as delineated in the above table. This estimate is based upon the scope of process and project as delineated in HGI's March 25, 2010, Class 25 feasibility study and estimate. General design services include the following:

- Process engineering to finalize the process design
- Specifying equipment, preparing RFQs, and evaluating supplier proposals and equipment selection
- Developing a site arrangement (GA) for the process areas and working with B&C to integrate the pond design
- Civil engineering for the process area infrastructure
- Structural design of foundations, buildings, and structures, except as noted.
- Mechanical engineering for the equipment installation
- Design of piping systems
- Electrical distribution and lighting of the process area
- Instrumentation
- Process control system including programming

A discipline-specific deliverables list, along with a list of assumptions and clarifications, are attached.

Project Approach
We understand from Sapphire that time is of the essence and Sapphire desires to have as much engineering complete by September 2010 as possible. Upon receipt of the "notice to proceed," we will immediately begin

Redacted Exemption 4

As soon as is practical, we request that a kick-off meeting be held either in person for coordination with Sapphire and B&C. The remaining sections of the facility will commence design efforts following that meeting.

We will provide weekly reports detailing issues that require resolution, key decisions made over the last week, current and upcoming work activities, and a summary of the engineering hours expended. On a monthly basis, we will provide a report showing our progress against the schedule and our forecast to complete the engineering. We also encourage regular conference calls to discuss issues and resolve problems.

Schedule
We believe that we can complete most of the engineering by mid-October 2010. A schedule is attached showing the basic sequencing of the engineering activities. In order to meet this schedule HGI will need to begin the design activities outlined in this letter almost immediately. Completing the engineering by mid October will depend upon

quickly finalizing the process design so that equipment can be selected, and on timely receipt of design information from B&C.

Compensation
We propose to provide these engineering services on a Redacted Exemption 4 in accordance with the attached detailed design rate sheet. We will invoice bi-weekly on our normal billing cycle. The agreement between our companies will be in accordance with our existing Memorandum of Engagement, attached hereto as Exhibit A and incorporated herein by reference.

Based on the scope of work described in this letter, we estimate our services will cost $ Ex. 4 We have not included any allowance for contingency or significant changes that will cause either additional or re-work.

The following is a breakdown of our estimated engineering costs by discipline:

	Hours	Cost
Redacted Exemption 4		
Total (Rounded)		

Thank you for the opportunity to work with you on this project. We look forward to the challenge of meeting your schedule.

Very truly yours,

Mark Warner, P.E.
Vice President, Process Industries

Enclosures:

Consolidated HGI/B&C Sheet Count
Overall HGI Deliverables List
Clarifications and Assumptions List
Schedule
Rate Sheet
Exhibit A – Memorandum of Engagement

cc: Dave Marsh (Sapphire Energy)
Doug Dudgeon (Harris Group)

Approved and Accepted by:

Sapphire Energy, Inc.

_____ _____
Signature Date

_____
Name, Title (Print or Type)

IABR Combined Drawing list

4/21/2010

Sheet	Sheet Number	Name
		Brown & Caldwell Drawings
1	G0	
2	G	
3	C-100	Redacted Exemption 4
4	C-101	
5	C-102	
6	02-C-110	
7	02-C-111	
8	02-C-112	
9	02-C-113	
10	02-C-114	
11	02-C	
12	02-C-200	
13	02-C-201	
14	02-C-202	
15	02-C-210	
16	02-C-211	
17	02-C-212	
18	02-C-301	
19	02-C	
20	02-C	
21	02-C	
22	03-C	
23	03-C	
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38	07-S	
39	02-S	
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41	P	

IABR Combined Drawing list

4/21/2010

Sheet	Sheet Number	Name
42	02-P	
43	02-P	
44	02-P	
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46	02-P	Redacted Exemption 4
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IABR Combined Drawing list

4/21/2010

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IABR Combined Drawing list

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IABR Combined Drawing list

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IABR Combined Drawing list

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IABR Combined Drawing list

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IABR Combined Drawing list

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IABR Combined Drawing list

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IABR Combined Drawing list

4/21/2010

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IABR Combined Drawing list

4/21/2010

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Redacted Exemption 4

Process Area Deliverables List

Document Count	Dwg Size	
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Process Area Deliverables List

Document Count	Dwg Size	
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1	Ea	Redacted Exemption 4
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1	Ea	
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Process Area Deliverables List

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Process Area Deliverables List

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1	A	
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Process Area Deliverables List

Document Count	Dwg Size	
7	D	
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2	B	Redacted Exemption 4
2	D	
30	A	
50	A	
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70	A	
1	A	
3	D	
1	D	
1	B	
1	D	
10	A	
20	A	
1		
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30	A	
1	A	
14	D	
7	D	
2	D	
1	B	
1	D	
30	A	
50	A	
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1	Ea	
1	Ea	
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Process Area Deliverables List

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Process Area Deliverables List

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Engineering Estimate Clarifications

The following assumptions and clarifications are made to the engineering estimate for the IABR process area detailed design.

1. General

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2. Process

Redacted Exemption 4

3. Civil/Structural/Architectural

Redacted Exemption 4

Redacted Exemption 4

4. Electrical

Redacted Exemption 4

5. Controls/Instrumentation

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Initial Here _____

GENERAL CONDITIONS
MEMORANDUM OF ENGAGEMENT FOR PROFESSIONAL SERVICES
HARRIS GROUP INC.

Attachment to and part of Letter, Proposal, or Agreement dated: January 23, 2009
Client: Sapphire Energy, Inc.
Project: Process Development and Cost Estimating

All professional services provided by HARRIS GROUP INC. ("Harris Group") are subject to the terms and conditions set forth in this Memorandum of Engagement unless and only to the extent expressly modified in writing and signed by Harris Group and Client. The parties acknowledge that from time to time forms containing printed terms and conditions inconsistent with the terms and conditions of this Memorandum of Engagement may be used and that such preprinted terms and conditions are not intended to, and will not apply to the services covered by this Memorandum of Engagement.

1. Personnel. Harris Group shall furnish the personnel required to perform the services covered by this Memorandum of Engagement ("the Services") and shall engage any other professional parties as it deems necessary for the performance of the Services.

2. Facilities and Equipment. Harris Group shall provide office space and customary office equipment and facilities at the offices of Harris Group for its own staff. Unless otherwise agreed in writing between the parties.

3. Instructions and Approvals. Harris Group shall cooperate fully with Client in providing the Services. Client shall name an authorized representative at or before the start of the work who shall be responsible for providing information, instructions, and approvals on Client's behalf. Such representative shall be available to Harris Group at all reasonable times. Client shall be responsible for all delays in performance of the Services caused by or arising out of Client's unavailability or its failure to provide information, instructions, or approvals timely.

4. Terms of Payment. Invoices shall be issued by Harris Group as set forth in its Rate Schedule then in effect and shall be due and payable on presentation. Invoices not paid within thirty (30) days of invoice date may be carried forward to the next invoice date and shall be subject to a carrying charge of 1.5 percent per month. If Client fails to pay any invoice as agreed, Harris Group shall have the right to terminate this Memorandum of Engagement immediately. The right to terminate under the terms of this paragraph shall be in addition to all other legal, equitable or contractual remedies available to Harris Group. Client shall have no right of setoff against any billings of Harris Group for disputed claims.

5. Differing Conditions. Harris Group shall be entitled to rely on the accuracy and completeness of all testing, services, reports, data, and other information furnished by Client regarding the project or the site. If Harris Group believes that any condition encountered at the site or during the course of the project is inaccurate or differs materially from the indicated, reflected or referred to by Client, its representative(s), employees, or consultants at the time of Harris Group's proposal, Harris Group shall notify Client within a reasonable time. Such differing conditions such as subsurface conditions or underground utilities; condition of existing structures; and the presence of asbestos or any substance or material categorized as hazardous or toxic by federal, state or local laws and regulations. Harris Group shall not be required to continue performing the Services until such time as Client and Harris Group have mutually agreed to a change in compensation, time for performance, and/or other resolution of the differing condition.

6. Changes. In addition to the change in compensation and/or time for performance referred to in paragraph 5 above, Harris Group shall be entitled to an increase in compensation and/or time for performance for any other changes to be made in the scope of the Services to the extent such changes do not arise from the negligence of Harris Group. Harris Group shall be required to give notice to Client that it intends to seek additional time or compensation within a reasonable time after the change has been requested. Harris Group shall not be required to perform any work connected with a change unless the parties have agreed on the amount of or the basis for calculating the time and/or compensation associated with the change.

7. Delays. Harris Group shall be entitled to prompt written notice by Client, and additional time and/or compensation for delays caused by or resulting from acts of Client, contractors, subcontractors, suppliers, or other third parties over whom Harris Group has no direction or control to the extent the delay(s) are not caused by Harris Group's negligence.

8. Insurance. Harris Group at its own expense, carries professional liability, workers' compensation and employer's liability coverage as required by applicable state law, and general liability insurance (including automobile liability). The amount of insurance available may vary from year to year. The professional liability insurance is written on a claims-made basis.

9. Standard of Care. Harris Group represents and agrees that its Services shall be performed in accordance with locally recognized engineering codes and standards and sound industry practices prevailing at the time of performance that are followed by professional engineers performing similar Services under similar conditions. Harris Group's liability for failing to meet the above referenced standard of care in any of Harris Group's Services shall be limited to the re-performance of such substandard Services to the extent that they arise out of the negligence of Harris Group. Such re-performance of Services shall be at no cost to Client, provided that Harris Group is notified by Client in writing of Harris Group's negligently performed Services within one year of Harris Group's completion of Services; and such notice shall specifically include a request for re-performance.

10. Indemnity. Harris Group agrees to indemnify and hold harmless Client from and against any and all liabilities, claims, penalties suits, and the cost and expense incident thereto which Client may hereinafter incur as a result of death or bodily injuries to any person or the destruction or damage to property to the extent caused solely by the negligent act, negligent omission or willful misconduct of Harris Group employees. In no event shall Harris Group be liable or responsible for special or consequential damages for claims, disputes, or other matters arising out of or relating to this Memorandum of Engagement, that exceeds three (3) times the amount of fees paid to Harris Group under this Memorandum of Engagement.

11. Performance by Contractors, Subcontractors and Suppliers. Harris Group shall not be required to make exhaustive, extensive, or continuous on-site inspections of the work except to the extent that such inspections are expressly specified in the description of the scope of the Services to be undertaken by Harris Group. No acceptance or approval by Harris Group of the work of contractors, subcontractors or suppliers shall excuse them of their obligations to Client for the proper performance of their work.

12. Construction Means and Safety. Client hereby expressly agrees that Harris Group shall assume no responsibility for control or right of control over any contractor, subcontractor or supplier, their agents, employees or others for whom they may be liable in connection with the means, methods, techniques, sequences, procedures and equipment used or not used by such contractors, subcontractors, or suppliers in their performance of any phase of the work, for placing into operation any plant or equipment, or for any safety precautions or programs related thereto. Responsibility and control for all such activities shall be solely and exclusively that of Client, such contractors, subcontractors, and suppliers.

13. Ownership of Documents. All designs, drawings, specifications, notes, data, samples, materials, report reproducibles and other work developed by Harris Group are "instruments of service" and after payment shall therefore become the property of the Client. Client agrees not to use, reuse, or adapt any work product developed by Harris Group for the specific project or application intended if Harris Group's services have been terminated prior to completion, unless agreement has been reached for such further use. Client shall defend, indemnify and hold harmless Harris Group Inc. from all claims, losses, liabilities, damages, expenses, and costs arising out of the unauthorized use or reuse of such work product by Client or agents of Client.

14. Costs and Attorneys' Fees. If either party under this Memorandum of Engagement makes any claim, the prevailing party shall be entitled to its costs and reasonable attorneys' fees at trial and on appeal.

15. Termination. Client and Harris Group have the right at any time to terminate this Memorandum of Engagement by giving five (5) days' written notice to the other party. If Harris Group is terminated for any reason other than a material breach of the terms and conditions of this Memorandum of Engagement, Client shall be responsible for payment of all reasonable demobilization costs, all expenses incurred or obligated at the date of termination, including the proportionate share of any Harris Group fee applicable to the Services performed through the date of termination.

16. Third-Party Beneficiaries. Nothing in this Memorandum of Engagement shall be interpreted or construed as giving any rights or benefits to anyone other than Harris Group and Client unless such third party has been expressly designated as a third-party beneficiary in this Memorandum of Engagement.

17. Governing Law and Severability. Washington law shall govern this Memorandum of Engagement unless otherwise provided. If any term, condition or provision of this Memorandum of Engagement or the application thereof to any circumstances is determined to be invalid or unenforceable to any extent, the remaining provisions of this Memorandum of Engagement shall not be affected but shall instead remain valid and fully enforceable.

18. Waivers. No waiver by either party of any default by the other will operate as, or be construed as, a waiver of any future default, whether like or different in character.

19. Headings. The headings used in this Memorandum of Engagement are for convenience and reference purposes only and are not to be used in interpreting or construing the substantive provisions of the Memorandum.

RATE SCHEDULE

PROFESSIONAL, TECHNICAL, AND PROJECT STAFF

Services performed by Harris Group Inc. shall be compensated at the following hourly billing rates:

Position*	Billing Rate**	Position*	Billing Rate**
Redacted Exemption 4			

* Based on National Society of Professional Engineers (NSPE) position descriptions as edited by Harris Group Inc.
** All rates are shown in U.S. dollars

Certain individuals with special expertise may be charged out at a rate independent of the Rate Schedule.

TECHNOLOGY EXPENSES

The following technology expenses shall be billed at $ Redacted Exemption 4

- Process simulation, CAD, and engineering computers
- Harris Group Inc. in-house reproduction and prints
- Communications (local & long distance telephone, cellular telephones, fax, e-mail)
- Office equipment, materials, and consumables

TRAVEL EXPENSES

Travel and living expenses incurred for personnel assignments will be billed at Redacted Exemption 4 Per diem may be used for long term assignments. Mileage charges for use of personal or company car will be at the current IRS allowable rate.

OTHER EXPENSES

The following expenses shall be billed at Redacted Exemption 4

- Outside reproduction and printing
- Courier service
- Services of subconsultants and subcontractors, and other special services
- Equipment and materials purchased specifically to perform the work of the project

INVOICING PROCEDURE

Unless otherwise arranged, charges will be billed every two weeks, accompanied by a summary of time spent by each staff member on the project, along with related direct charges. Invoices are due and payable on presentation. Invoices not paid within thirty (30) days shall accrue interest, until paid, at the lesser of 1.5% per month or the highest rate permitted by law.

This rate sheet is subject to adjustment on December 31, 2010.

PI-210

ATTACHMENT A

STATEMENT OF WORK
PERMITTING AND TECHNICAL SUPPORT
PROPOSED IABR FACILITY
LUNA COUNTY, NEW MEXICO
Work Order 5

Prepared for:

Sapphire Energy Company
3115 Merryfield Row
San Diego, CA 92121

Prepared by:

AMEC Geomatrix, Inc.
1824 North Last Chance Gulch
Helena, Montana 59601
Contact: Myles Grotbo
Email: myles.grotbo@amec.com
Ph: (406) 442-0860

AMEC Geomatrix

April 19, 2010

INTRODUCTION AND OBJECTIVES

Sapphire Energy (Sapphire) is seeking assistance from AMEC Geomatrix, Inc. (AMEC Geomatrix) in securing certain Federal, State, and local permits needed to construct its planned Integrated Algal Bio-Refinery (IABR) facility in Luna County, New Mexico. Several permits or permissions for the project have already been secured by Sapphire. Objectives identified for efforts to be completed under this SOW include the following:

- Prepare necessary remaining environmental permit applications to support development of the IABR to ensure compliance with applicable rules and regulations.

- Provide technical support to Sapphire in responding to any deficiencies in data and/or permit applications noted by the various regulatory agencies following their review of applications.

- Provide oversight of activities associated with installation and operation of the proposed test ponds at the Cooper property (to test various liners) to document compliance with environmental standards and criteria established by the New Mexico Environmental Department (NMED).

Work tasks identified in this SOW are designed to provide for a logical progression of efforts such that these overall objectives can be achieved. A primary assumption in completing any and all of these tasks is that Sapphire will provide AMEC Geomatrix a 25% complete design for the IABR prior to initiating efforts.

APPROACH

The various components of the effort are described more fully below.

Task 1 – Prepare Necessary Federal Permit Applications

AMEC Geomatrix will prepare applications for the following Federal permits needed to support development of the IABR:

Redacted Exemption 4

Task 2 – Prepare Necessary State Permit Applications

AMEC Geomatrix will prepare applications for the following State permits needed to support development of the IABR:

Redacted Exemption 4

Task 3 – Prepare Necessary Local Permit Applications

AMEC Geomatrix will prepare applications for the following Local permits needed to support development of the IABR:

Redacted Exemption 4

Task 4 – Provide Construction Oversight of Test Ponds

AMEC Geomatrix will provide oversight of activities associated with installation and operation of the test ponds

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Redacted Exemption 4

Task 5 – Manage Project, Attend Meetings as Requested

Under this task, AMEC Geomatrix management staff will ensure the project is completed in an orderly and efficient fashion such that all project objectives are met. Specifically, the following functions will be conducted under this task:

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Task 6 – Complete Other Tasks, as Assigned

This task provides for an allowance that Sapphire would use to assign yet defined work tasks to AMEC Geomatrix to complete. For purposes of the budget included for this task, we have allotted $20,000 for this purpose.

SCHEDULE

It is estimated that, assuming the Notice to Proceed with the Work Order is received from Sapphire along with the 25% engineering design for the proposed IABR project by

Redacted Exemption 4

BUDGET

Attachment B summarizes the budget necessary to complete the scope of services described above. Assumptions used in developing this budget include the following:

- The project will adhere to the schedule identified herein.
- Redacted Exemption 4
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- Redacted Exemption 4

STAFFING

The AMEC Geomatrix staff assigned to this project include the following:

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- Redacted Exemption 4
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Staff- and project-level personnel will be accessed from AMEC offices in

Redacted Exemption 4

A. PMP Project Information

OBP WBS	**5.11.1.1**	**Title**	**Integrated Algal Biorefinery**				
Contact Information	Name	Phone	Email	Program Element/Area	5-Integrated Biorefineries	CID or Laboratory Designation	EE0002884
HQ Technology Manager	Paul Grabowski	PG 202 586 0478	paul.grabowski@ee.doe.gov	Project Initiated (dd/mm/yy)	1-Jan-10	CPS Agreement #	WBS5.11.1.1
PMC Project Officer	Christy Sterner	CSS (303)275 4720	christy.sterner@go.doe.gov	Planned Project Completion Date (dd/mm/yyyy)	30-Sep-14	Program Value (B&R) Code	1004173
PMC Project Monitor	Christine English	ce 720-356-1324	christine.english@go.doe.gov				
Company Contact or Lab Relationship Manager	Dave Marsh	949-202-4700	dave.marsh@sapphir	Last Gate or Project Review (dd/mm/yy)		Status	Proposed
Principal Investigator	Jaime E. Moreno	949-202-4700	jaime.moreno@sapph	Next Anticipated Stage Gate or Project Review (mm/yy)		Overall Stage of Development	
Co-Principal Investigator (if applicable)				Performing Organization (Only Prime Recipient)	Sapphire Energy, Inc.	Funding Partner(s) [Any partner or subcontractor who provides cost share]	None.
Project Description (non-proprietary)	The Integrated Algal Biorefinery (IABR) will be built in Luna County, near Columbus, New Mexico. The algae will fix approximately 56 metric tons of CO2 per day and produce, on average, 100 barrels of green crude oil per day, or approximately 1 million gallons per year of finished fuel product. The successful project will demonstrate the technical and economic feasibility of the algae to green fuels process that will form the basis for a series of commercial scale biorefineries.						
Summary of Project Objectives & Tasks (at the A, B, C, etc.level from Section C of PMP, non-proprietary)	The Sapphire IABR project will realize the following objectives: 1. The design and construction of: all required infrastructure, including equipment, design and control methods, for the production of algal oil for green jet fuel and green diesel. 2. The shakedown and testing of: material and energy flows for all processes inputs and product flows and comparison of different process operating conditions, product flow rates and yields from different commercial algal strains against model projections. 3. The establishment of: steady state operations including material and energy balances; plant process design, including operating conditions, cash flow and capital requirements for a full-scale commercial plant capable of producing greater than 150 million gallons of algae oil per year (10,000 bpd). A. Phase 0 - Origination B. Phase 1 - Conceptual Analysis C. Phase 2 - Process Design D. Phase 3 - Front End Engineering Design E. Phase 4 - Implementation F. Phase 5 - Checkout and Startup G. Phase 6 - Operational Reporting I. Project Management and Reporting						
Annual Work Plan FY2010 (typically 1-4 paragraph lengths of text or about 1/2 to 3/4 page of text)	FY2010 Anual Work Plan Redacted Exemption 4						

Summary of Work to date (typically 2-6 paragraphs or about 1-2 pages of text)	Redacted Exemption 4

Prime Recipient (s) Name (First entry must match cells AI-AR:8)	Location (zipcode)	Total DOE Funds Obligated to date	Carryover of DOE funding into FY10 (if applicable)	FY10 DOE Spend plan	DOE FY Estimated Spending Plan (if applicable) FY11	FY12	FY13	FY14	Current Approved Spend Plan Total	Comments/Issues
Sapphire Energy, Inc.	92691	$50,000,000.00	$50,000,000.00	$4,286,626.00	$24,000,000.00	$7,250,000.00	$7,250,000.00	$7,213,374.00	$50,000,000.00	
Subcontractors or Lab Partners										

Funding by task number at the major task level (A,B,C,D, etc.) as specified in section C below (columns E-H)		Total Funds to date		FY10 Total Spend plan (DOE & Cost Share)	Fiscal Year Estimated Spending Plan (if applicable, including Cost Share) FY11	FY12	FY13	FY14	Current Approved Spend Plan Total	Comments/Issues
A. Phase 0 - Origination										
B. Phase 1 - Conceptual										
C. Phase 2 - Process Design										
D. Phase 3 - Front End										
E. Phase 4 - Implementation										
F. Phase 5 - Checkout and										
G. Phase 6 - Post Project										
H. Research and Development										
I. Reporting										

Redacted Exemption 4

C. Project Plan with tasks, subtasks, milestones, deliverables, Go No/Go decision points and including performance requirements and metrics

Project WBS Number	Number of Task, Subtask, Milestone, Deliverable including Go No/Go Decision Points	Title - Tasks, Subtasks, Milestones, Deliverables including Go No/Go Decision Pts	*For milestones* provide type	Performer(s)	Program Pathway C Milestones Link	Start Date (Tasks, Subtasks Only)	Planned Completion Date (Tasks or Milestone)	Relation-ship to Pathway Milestone(s)	Develop-ment stage of task or subtask	Barriers Addressed (Use Barrier numbers from Appendix B to show Barriers Addressed. Separate multiple entries with semicolon)	Task or Milestone Completion Criteria (to include cost and performance metrics)	Task or Milestone decription (as needed)	Mark as proprietary or confidential
5.11.1.1	A.1	Redacted Exemption 4		Sapphire Energy,		Redacted Exemption 4					Redacted Exemption 4		
5.11.1.1	A.1.ML.1		E - Project	Sapphire Energy,									
5.11.1.1	A.1.ML.2		E - Project	Sapphire Energy,									
5.11.1.1	A.1.ML.3		E - Project	Sapphire Energy,									
5.11.1.1	A.1.ML.4		E - Project	Sapphire Energy,									
5.11.1.1	A.2			Sapphire Energy,									
5.11.1.1	A.2.1			Sapphire Energy,									
5.11.1.1	A.2.1.ML.1		E - Project	Sapphire Energy,									
5.11.1.1	A.2.1.ML.2		E - Project	Sapphire Energy,									
5.11.1.1	A.2.1.ML.3		E - Project	Sapphire Energy,									
5.11.1.1	A.2.1.ML.4		E - Project	Sapphire Energy,									
5.11.1.1	A.2.1.ML.5		E - Project	Sapphire Energy,									
5.11.1.1	A.2.2			Sapphire Energy,									
5.11.1.1	A.2.2.ML.1		E - Project	Sapphire Energy,									
5.11.1.1	A.2.2.ML.2		E - Project	Sapphire Energy,									
5.11.1.1	A.2.2.ML.3		E - Project	Sapphire Energy,									
5.11.1.1	A.2.2.ML.4		E - Project	Sapphire Energy,									
5.11.1.1	A.2.2.ML.5		E - Project	Sapphire Energy,									
5.11.1.1	A.2.2.ML.6		E - Project	Sapphire Energy,									
5.11.1.1	A.2.2.ML.7		E - Project	Sapphire Energy,									
5.11.1.1	A.2.2.ML.8		E - Project	Sapphire Energy,									
5.11.1.1	A.2.2.ML.9		E - Project	Sapphire Energy,									
5.11.1.1	A.2.3			Sapphire Energy,									
5.11.1.1	A.2.3.ML.1		E - Project	Sapphire Energy,									
5.11.1.1	A.2.3.ML.2		E - Project	Sapphire Energy,									
5.11.1.1	A.2.3.ML.3		E - Project	Sapphire Energy,									
5.11.1.1	A.2.3.ML.4		E - Project	Sapphire Energy,									
5.11.1.1	C			Sapphire Energy,									
5.11.1.1	C.1			Sapphire Energy,									
5.11.1.1	C.1.ML.1		E - Project	Sapphire Energy,									
5.11.1.1	C.1.1			Sapphire Energy,									
5.11.1.1	C.1.ML.2		E - Project	Sapphire Energy,									
5.11.1.1	C.1.2			Sapphire Energy,									
5.11.1.1	C.1.3			Sapphire Energy,									
5.11.1.1	C.1.4			Sapphire Energy,									
5.11.1.1	C.2			Sapphire Energy,									
5.11.1.1	C.2.ML.1		E - Project	Sapphire Energy,									
5.11.1.1	C.2.1			Sapphire Energy,									
5.11.1.1	C.2.2			Sapphire Energy,									
5.11.1.1	C.2.3			Sapphire Energy,									
5.11.1.1	C.3			Sapphire Energy,									
5.11.1.1	C.3.GN.1		GN - Go	Sapphire Energy,									
5.11.1.1	D			Sapphire Energy,									
5.11.1.1	D.1			Sapphire Energy,									
5.11.1.1	D.1.ML.1		E - Project	Sapphire Energy,									
5.11.1.1	D.2.ML.1		E - Project	Sapphire Energy,									
5.11.1.1	D.2.ML.2		E - Project	Sapphire Energy,									
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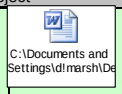
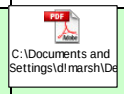
Provide budgets allocated for:	$	Name	Description and Use
Any special facilities required for the project (Unique to your project)			Project funding is being used to construct a demonstration scale facility.
Equipment - Both capital & other needed for the project (over $5,000 and use for >1 yr)			Project funding is being used to construct a demonstration scale facility.
Other Items required for completing the project			

Insert Text File (Word) of Full SOW ►►	 C:\Documents and Settings\d!marsh\De	Insert Gantt Chart (or equivalent) ►►	 C:\Documents and Settings\d!marsh\De

Program Barriers Addressed

Feedstock Integration

Ft-A. Resource Availability and Cost: The lack of credible data on price, location, quality and quantity of biomass creates uncertainty for investors and developers of emerging biorefinery technologies. In addition to a lack of information regarding national cellulosic biomass production, current estimates of feedstock resources are limited in scope, and do not consider how major technological advantages in production technologies will impact biomass availability. Due to the diversity and wide distribution of biomass feedstock resources, a regional approach is required to complete a more detailed assessment of the resources initially identified in the Billion Ton study. Feedstock supply is a significant cost component of bio-based fuels, products, and power.

Ft-B. Sustainable Production: Existing data on the environmental effects of feedstock production and residue collection are not adequate to support lifecycle analysis of biorefinery systems. The lack of information and decision support tools to predict effects of residue removal as a function of soil type, and the lack of a selective harvest technology that can evenly remove only desired portions of the residue make it difficult to assure that residue biomass will be collected in a sustainable manner. Until the residue issue is addressed, particularly with regard to corn stover, deployment of the Agricultural Residue pathway will be severely constrained. The production and use of perennial energy crops also raise a number of sustainability questions (such as water and fertilizer inputs, establishment and harvesting impacts on soil, etc.) that have not been comprehensively addressed.

Ft-C. Crop Genetics: Current crops and potential new crops require improvement to achieve the production potential estimates of the billion ton vision. There is inadequate information on plant biochemistry as well as insufficient genomic and metabolic data on many potential biomass crops. Genetic modification of energy crops for improved characteristics may create risks to native populations of related species, and any modification of commodity crops to improve residue characteristics may affect grain values.

Ft-D. Sustainable Harvest: Current crop harvesting machinery is unable to selectively harvest desired components of biomass and address the soil carbon and erosion sustainability constraints. Biomass variability places high demand and functional requirements on biomass harvesting equipment. Current systems cannot meet the capacity, efficiency, or delivered price requirements of large cellulosic biorefineries, nor can they effectively deal with the large biomass yields per acre of potential new biomass feedstock crops. In addition, feedstock specifications and standards against which to engineer harvest equipment, technologies, and methods, do not currently exist

Ft-G. Feedstock Quality and Monitoring: Physical, chemical, microbiological, and post-harvest physiological variations in feedstocks arising from differences in variety, geographical location, and harvest methods are not well understood. Passive, noninvasive analytical tools and sensors for rapid and/or real-time compositional and conversion efficiency measurements for cellulosic feedstocks are needed. In addition, processor standards and specifications for feedstocks are not currently available.

Ft-H. Storage Systems: Engineering analysis of unconventional storage methods, including centralized versus distributed systems, is needed to define storage requirements. Key elements requiring better understanding include in storage biomass losses, infrastructure for packaged (i.e., bale, silage wrap, etc.) and bulk stored biomass, storage bulk density, and post-harvest physiology of storage systems. These storage elements need to be understood as a function of feedstock source, biomass moisture, climate, storage time, and cost. Stored biomass that is or becomes wet is susceptible to spoilage, rotting, spontaneous combustion, and odor problems, therefore, the impact of these post-harvest physiological processes must be controlled to the benefit of biorefining processes.

Ft-J. Biomass Material Properties: Data on biomass quality and physical property characteristics for optimum conversion are limited. Information on functional moisture relations on quality and physical properties of biomass as affected by crop variability and climatic conditions during harvest and post-harvest operations is incomplete. Methods and instruments for measuring physical and biomechanical properties of biomass are lacking.

Ft-K. Biomass Physical State Alteration (i.e., grinding, densification, and blending): The initial sizing and grinding of biomass affects efficiencies and quality of all the downstream operations, yet little information exists on these operations with respect to the multiplicity of cellulosic biomass resources and biomass format requirements for biorefining. New technologies and equipment are required to process biomass between the field and conversion facilities. The harvest season for most crop-based cellulosic biomass is short, especially in northern climates, thus requiring preprocessing systems that facilitate stable biomass storage, densification, and blending for year-round feedstock delivery to the biorefinery.

Ft-L. Biomass Material Handling and Transportation: The capital and operating costs for the existing package-based (i.e., bales, modules, pellets, etc.) equipment and facilities are not cost effective. The low density and fibrous nature of cellulosic biomass make it difficult and costly to collect, handle and transport. Present methodologies for collecting, storage handling, transport, and in-biorefinery handling of the biomass are too costly and inefficient for handling million ton quantities of biomass in a manner compliant with the efficiency and permitting requirements of cellulosic biorefineries.

Ft-M. Overall Integration: Existing biomass collection, handling, and transport systems are not designed for the large-scale needs of integrated biorefineries. Feedstock logistics infrastructure has not been defined for various locations, climates, feedstocks, storage methods, etc. The lack of experience with integrating time-sensitive collection, storage, transportation and delivery operations to ensure year-round supply of large amounts of biorefinery feedstock is a barrier to widespread implementation of biorefinery technology. The lack of data on variability of biomass resources and how this variability affects shelf life and processing yields are further barriers. In addition, it may be possible to better integrate one or more aspect of the feedstock supply system either alone or in combination with biorefinery operations. The lack of a quantitative analysis that assesses the benefits and drawbacks of these potential integration options is a potential barrier to cost savings and biorefinery efficiency improvement.

Biochemical Conversion

Bt-A. Biomass Fractionation: Fractionation can be used to increase the value of the individual components in biomass prior to their subsequent conversion to products. Currently, the interactions between chemical, biological, solvation (ability to go into solution), and mechanical processes to ultimately allow biomass to be more efficiently fractionated at high yield into high-purity components is insufficiently understood to implement commercially.

Bt-B. Biomass Variability: The characteristics of biomass can vary widely in terms of physical and chemical composition, size, shape, moisture content, and bulk density. These variations can make it difficult (or costly) to supply biorefineries with feedstocks of consistent, acceptable quality year-round, and also feedstock variability affects overall conversion rate and product yield of biomass conversion processes.

Bt-C. Biomass Recalcitrance: Lignocellulosic biomass feedstocks are naturally resistant to chemical and/or biological degradation. The fundamental role of biomass structure and composition and the critical physical and chemical properties that determine the susceptibility of cellulosic substrates to hydrolysis are not well understood. This lack of understanding of the root causes of the recalcitrance of biomass limits the ability to focus efforts to improve the cost-effectiveness and efficiency of pretreatment and other fractionation processes.

Bt-D. Pretreatment Chemistry: Thermochemical prehydrolysis of biomass, typically referred to as pretreatment, is required to break down the structure of biomass and increase its susceptibility to subsequent enzymatic hydrolysis by cellulase enzymes. The critical physical and chemical properties that determine the susceptibility of cellulosic substrates to hydrolysis and the role that lignin and other pretreatment products play in impeding access to cellulose are not well enough understood. Continued significant cost reductions in pretreatment technologies via improved sugar yields and quality require developing a better understanding of pretreatment process chemistries, including the kinetics of hemicellulose and cellulose hydrolysis.

Bt-E. Pretreatment Costs: Pretreatment reactors typically require expensive materials of construction to resist acid or alkali attack at elevated temperatures. In addition, the impact of reaction configuration and reactor design on thermochemical cellulose prehydrolysis is not well understood. Developing lower-cost pretreatments depends on the ability to process the biomass in reactors designed for maximum solid levels and fabricated out of cost-effective materials.

Bt-F. Cellulase Enzyme Production Cost: Cellulase enzymes remain a significant portion of the projected production cost of sugars from cellulosic biomass. Cost-effective enzyme production technologies are not currently available, although significant progress has been made through concerted efforts with industrial enzyme producers.

Bt-G. Cellulase Enzyme Loading: Reducing the cost of enzymatic hydrolysis depends on identifying more efficient enzyme preparations and enzyme hydrolysis regimes that permit more cost-effective and lower ratios of enzyme to substrate to be used.

Bt-H. Enzyme Biochemistry: Currently available enzymes do not exhibit the high thermostability and substantial resistance to sugar end-product inhibition. Developing enzymes that enable low-cost enzymatic hydrolysis technology requires more understanding of the fundamental mechanisms underlying the biochemistry of enzymatic cellulose hydrolysis, including the impact of biomass structure on enzymatic cellulose decrystallization. Additional efforts aimed at understanding the role of cellulases and their interaction not only with cellulose but also the process environment is needed to affect further reductions in cellulase cost.

Bt-I. Cleanup/Separation: Sugar solutions resulting from thermochemical pretreatment are impure, containing a mixture of sugars and a variety of non-sugar components. Potential impurities include acetic acid liberated upon hydrolysis of hemicellulose, lignin-derived phenolics solubilized during pretreatment, inorganic acids or alkalis or other compounds introduced during pretreatment, various salts, and hexose and pentose sugar degradation or transglycosylation products. The presence of some of the non-sugar components can be inhibitory to microbial fermentation or biocatalysis or can poison chemical catalysts. Low-cost purification technologies need to be developed that can remove impurities from hydrolysates and provide concentrated, clean sugar feedstocks to manufacture biofuels and biobased products.

Bt-J. Fuels Organism Development: Fermentation organisms used today have not been optimized for production of liquid fuels (ethanol, butanol and other alcohols) from the sugar mixture in the hydrolyzate broth produced during biomass pretreatment and enzymatic hydrolysis. For example, current organisms are not capable of utilizing the five-carbon sugar components, xylose and arabinose, in the biomass hydrolyzate as efficiently as glucose. In addition, impurities generated during pretreatment inhibit the organism, resulting in slow fermentations and incomplete utilization of sugars; this can lead to the need for costly purification. Improvements in fermentative organisms to perform in hydrolysate broths can significantly lower capital costs.

Bt-K. Biological Process Integration: Process integration remains a key technical barrier hindering development and deployment of biochemical conversion technologies. Biochemical conversion technologies currently present large scale-up risks because of lack of high-quality performance data on integrated processes carried out at the high solids conditions required for industrial operations. The effect of feed and process variations throughout the process must be understood to ensure robust, efficient biorefineries. Process integration work is essential for characterizing the complex interactions that exist between many of the processing steps, identifying unrecognized separation requirements, addressing bottlenecks and knowledge gaps, and generating the integrated performance data necessary to develop predictive mathematical models that can guide process optimization and scale-up.

Bt-L. Biochemical/Thermochemical Processing Integration: Integration of the entire biorefinery is the final conversion barrier and overcoming it will require successful integration at the interfaces between the biochemical and thermochemical processes. For example, the lignin residue can be used as a feedstock for syngas or bio-oil production and for subsequent conversion to combined heat and power, fuels, or chemicals. Without planned and managed integration, the complete picture of biomass conversion to fuels and chemicals will not be clear enough to attract potential developers because the risks of commercialization will be too high for financiers. As conversion technologies mature, higher levels of integration will be feasible and second generation biorefineries are envisioned to be closely coupled biochemical / thermochemical facilities enabling the most efficient use of a wide range of feedstocks.

Thermochemical Conversion

Tt-A. Feeding Dry Biomass: In the near term, there are no significant barriers to feeding and handling dry wood or agricultural residues in atmospheric systems provided they are of a relatively uniform particle size. In the longer term, there is a need for improvements in the processing and feeding of dry biomass including densification and removal of problematic chemical contaminants (e.g. alkali species). Demonstrating reliable feeding of dry biomass into pressurized systems is also needed.

Tt-B. Feeding or Drying Wet Biorefinery Streams: There is a need to understand the costs and trade-off of drying or feeding wet biorefinery residues such as wet lignin-rich fermentation residues. Innovative dryer designs capable of utilizing low-value process heat will be important to the integrated biorefinery.

Tt-C. Gasification of Wood, Biorefinery Residue Streams and Low Sugar Content Biomass: There is a need to understand the fuel chemistry and physical handling properties of other biomass feedstocks, minor byproducts and co-products, and biorefinery residual solids. This includes developing an understanding of gasification options and their chemistries for materials including wood, spent pulping liquors, agricultural residues that are high in minerals, high-lignin feedstocks and residues, and high-moisture organic residues.

Tt-E. Pyrolysis of Biomass: Development of new methods to control the pyrolytic pathways to bio-oil intermediates in order to increase product yield and recovery is needed. These product quality improvements are important to achieving the stability specifications of the resulting bio-oil and may also result in more favorable chemistry for processing in conventional petroleum refineries. New methods to clean and stabilize the bio-oil intermediate are also needed to ensure the product is compatible with refining technology. These advances include improved hydrotreating catalysts and techniques for processing the bio-oil.

Tt.-F. Syngas Cleanup and Conditioning: There is a near-term need for gas cleaning and conditioning technology that can cost-effectively remove contaminants such as tar, particulates, alkali, and sulfur. The interactions between the catalysts used for gas cleanup and conditioning, and the gasification conditions and feedstock are not well understood. These interactions require careful attention to trace contaminants.

Tt-G. Fuels Catalyst Development: The production of mixed alcohols from syngas has been known since the beginning of the last century; however, the commercial success of mixed alcohol synthesis has been limited by poor selectivity and low product yields. Improved catalysts with increased productivity and selectivity to higher alcohols are required to enable viable capital costs. The development of robust catalysts for the upgrading of pyrolysis oil for the production of liquid transportation fuels is critical to the economic viability of the process. The catalysts must afford high selectivity to the desired end product, be robust with respect to the pyrolysis oil impurities, and have high conversion rates and long lifetimes. Improvement to the robustness of hydrocracking catalysts for producing hydrocarbon biofuels via pyrolysis is also needed.

Tt-H. Validation of Syngas Quality: Syngas quality specifications for production of liquid fuel products like methanol/dimethyl ether (MeOH/DME), mixed alcohols and hydrocarbon liquids are reasonably well known. However, validation that syngas from biomass can meet the rigorous quality specification needed for the production of liquid fuels via catalytic synthesis is still needed.

Tt-I. Sensors and Controls: Effective process control will be needed to maintain plant performance and regulate emissions at target levels with varying load, fuel properties, and atmospheric conditions. Commercial control systems need to be developed for thermochemical processes and systems.

Integrated Biorefineries

Im-A. Political and Competitive Environment: The commercial use of biomass technologies is dependent on a variety of external factors which are beyond OBP's control. These exogenous variables include future energy prices, availability of conventional energy supplies, cost or success of competing technologies, labor and feedstock costs, and consumer preferences regarding energy sources.

Im-B. Lack of Feedstock Infrastructure: The uncertainty and concern for the reliability and affordability of feedstocks are a barrier to procuring capital funding for start-up biorefineries.

Im-C. Lack of Consideration of Externalities: The lack of a framework for the monetization and reward of external benefits, like energy security and environmental improvements, is a barrier to deploying biorefineries on a wide-scale basis.

Im-D. Biorefinery Plant Economics: The largest market hurdles are often associated with the scale-up and economics of pioneer plants, because the financial investment required will be high. Achieving design capacity as quickly as possible after start-up is critical to achieving economic viability. Reasonable estimates of plant performance will be key to attracting investors and future market planning

Im-E. Lack of Industry Standards and Regulations: The lack of a regulatory approach or cohesive strategy for the permitting of biorefineries has the potential to constrain biomass development and result in industry and financial institutions that are unwilling to accept the risks. The long lead time associated with developing and understanding new and revised regulations for new technology restricts commercialization. In the case of permitting, the lack of standard or consistent implementation of existing general regulations hampers development.

It-A. End-to-End Process Integration: Successful advances in biochemical processes and the biorefinery concept are co-dependent. This biorefinery concept encompasses a wide range of technical issues related to collecting, storing, transporting, and processing diverse feedstocks, as well as the complexity of integrating several innovative process steps, thus entailing considerable technical risk. The challenge of feed-to-product process integration is crucial, as it impacts both performance and profitability.

It-B. Commercial-Scale Demonstration Facilities: As with all new process technologies, demonstrating sustained integrated performance that meets technical, environmental and safety requirements at sufficiently large scale is an essential step toward commercialization. Demonstration facilities that are capable of testing and validating new technologies and integrated systems are critical to successful commercial deployment. Additionally, increased understanding of these combined systems will result in the optimization of process configurations. Integrating new bioenergy processes with existing biorefineries, while improving the efficiency of all biorefineries, are two critical areas of focus for the platform.

It-C. Risk of Pioneer Technology: The first biorefineries will incorporate a variety of new technologies. The number of new process steps implemented in a demonstration project has been shown to be a strong predictor of future performance shortfalls. Heat and mass balances, and their implications, are not likely to be well understood in regard to new technologies. In addition, the impact of unanticipated buildup of impurities in process streams that can result in abrasion and corrosion of plant equipment and deactivation of process catalysts is not well understood.

It-D. Sensors and Controls: Effective process control will be needed to maintain plant performance and emissions at target levels because of variability in processing conditions, load, feedstock and intermediate stream properties. Development of new sensors and analytical instruments is needed to optimize control systems for biochemical and thermochemical systems. There are several key technical barriers to consider, including the lack of real-time sensors for measuring feedstock moisture and composition, the need for better tools to analyze various process streams, and the lack of process control systems for reactor systems and subsystems.

It-E. Engineering Modeling Tools: The current level of understanding regarding fuels chemistry is insufficient for optimization, scale-up, and commercialization. In order to better understand how fuel chemistry affects commercial viability, rigorous engineering computational fluid dynamic models are needed. Engineering modeling tools are also needed to address heat integration issues.

Biofuels Distribution and End Use

Dm-A. Lack of Biofuels Distribution Infrastructure: The lack of infrastructure to transport, store and dispense biofuels puts biofuels at a disadvantage compared to conventional fuels that already have mature infrastructure. Today's biofuels distribution infrastructure, which includes about 1,000 E85 fueling stations, is concentrated in the Midwest, near the feedstocks (corn and soybeans) and ethanol and biodiesel production facilities. To contribute significantly to the 20 in 10 volumetric goal, expansion beyond this region of the country will be required.

Dm-B. Availability of Biofuels-Compatible Vehicles: About six million ethanol FFVs have been manufactured for the U.S. market, at a price competitive with conventional vehicles. However, at this time, only a limited number of vehicle model/fuel type combinations exist. In addition, most FFVs on the road today use less than 4 gallons of E85 per year due to the limited number of E85 pumps across the U.S.

Dm-C. Industry and Consumer Acceptance and Awareness: To be successful in the marketplace, biomass-derived products must perform at the same level or better than the existing fossil-energy-based products. Industry partners and consumers must believe in the quality, value and safety of biomass-derived products and their benefits.

Dt-A. Ethanol Pipeline Distribution Issues: Ethanol is a stronger solvent than the petroleum products moved via pipeline today. Consequently, ethanol will remove water, rust, gums and other contaminants from the existing petroleum pipeline distribution system. This downgrades the value of the delivered ethanol and adds back-end costs to restore the fuel to meet specifications. Construction of new dedicated ethanol pipelines are limited by the high cost of capital investment, insufficient ethanol supplies, materials compatibility issues, technologies that can measure quality in real time, and existing right-of-way agreements.

Dt-B. Limited Information Available for Developing Codes and Standards: National organizations that develop codes and standards recognize that additional date is required to integrate biofuels into the model codes for infrastructure construction. Thousands of local code jurisdictions in the U.S. adopt and modify these model codes for use in their jurisdictions. At this time, insufficient technical information hinders revision of various codes and standards in support of the quickly accelerating biofuels industry. Lack of codes as well as costly project permitting processes can stymie the introduction of new technologies, including infrastructure, into the marketplace.

Dt-C. Materials Compatibility Issues of Alcohol Fuels: Alcohol fuels and alcohol fuel blends require components throughout the infrastructure system (e.g., fuel storage, pipes and piping, and on-board vehicle systems) that are compatible with the higher electrical conductivity and solubility of the fuel. Higher cost materials, including stainless steel, lined fiberglass tanks, and mild steel with epoxy coatings, are often required to ensure compatibility and mitigate risk of decay or failure.

Dt-D. Increased Evaporative Hydrocarbon Emissions of Ethanol Blends: Adding ethanol to gasoline increases the fuel volatility, as measured by its Reid vapor pressure (RVP). The higher RVP results in higher evaporative hydrocarbon emissions from ethanol blends than from straight gasoline. Ethanol in gasoline also increases the permeability of plastic on-board fuel tanks, which in turn contributes to increased evaporative emissions.

Dt-E. Ethanol Blend Vehicle Fuel Economy: Since ethanol has a lower heating value than gasoline (83,000 Btu/gal for E85 vs. 113,500 Btu/gal for gasoline), E85 delivers a lower fuel economy when compared to gasoline on a gallon by gallon basis. Lower fuel economy can be counteracted by optimizing the engine design to take advantage of the higher octane rating of E85 (98 for E85 vs. 87 for gasoline).

Sustainability

St-A. Climate: Reduce greenhouse gas emissions associated with biofuel production, conversion and use, in comparison to fossil fuels.

St-B. Soil Health and Agronomics: Maintain or improve soil quality and land productivity.

St-C. Water Quality and Quantity: Increase water re-use efficiency and maintain or improve water quality.

St-D. Air Quality: Maintain or improve air quality by reducing the emissions of harmful pollutants such as SO2, NOx, and aromatic compounds.

St-E. Biological Diversity: Conserve biological diversity.

St-F. Land Use: Minimize negative land use change impacts domestically and globally.

St-G. Efficiency and Productivity: Enhance efficient use of nonrenewable resources and recovery of resources; maximize conversion efficiency and productivity.

St-H. Profitability: Lower production costs.

St-I. Rural Development: Enhance economic welfare and rural development through job creation and income growth.

St-J. Standards: Develop standards and corresponding metrics for ensuring sustainable biofuel production globally.

St-K. Energy Diversification and Security: Reduce dependence on foreign oil and increase energy supply diversity.

St-L. Net Energy Balance: Ensure positive net energy balance for all alternatives to fossil fuels.

1. Wet Mill Improvements Pathway	
Milestone #	**Milestone Title**
M.1	***Complete systems level demonstration and validation of technologies to improve corn wet mill facilities using corn grain feedstock***
M.1.1	Demonstrate and validate economical residual starch conversion in a wet mill
M.1.1.1	Convert residual starch in fiber stream to EtOH
M.1.1.2	Evaluate new feed product
M.1.1.3	Validate integrated process at pilot scale
M.1.1.4	Validate new process in wet mill
M.1.2	Demonstrate and validate economical fiber conversion to C5 and/or mixed C5/C6 sugars in a wet mill (residual starch also expected to be converted during fiber processing)
M.1.2.1	Solubilize hemicellulose in fiber to C5 sugars
M.1.2.2	Hydrolyze cellulose to C6 Sugar
M.1.2.3	Validate integrated process at pilot scale
M.1.2.4	Evaluate new feed product
M.1.2.5	Validate new process in wet mill
M.1.3	Demonstrate and validate economical conversion of mixed sugars to ethanol in a wet mill
M.1.3.1	Convert released sugars to ethanol
M.1.3.2	Validate integrated process at pilot scale
M.1.3.3	Validate new process in wet mill
M.1.4	Demonstrate and validate economical new products from C5 or mixed C5/C6 sugars in a wet mill
M.1.4.1	Convert released C5 sugars to products
M.1.4.2	Convert C5 sugars to building block chemicals
M.1.4.3	Convert mixed sugars to products
M.1.4.4	Convert mixed sugars to building block chemicals
M.1.4.5	Convert building block chemicals to products
M.1.4.6	Demonstrate product separation and recovery specification
M.1.4.10	Validate integrated process at pilot scale
M.1.4.11	Validate new process in wet mill
M.1.5	Demonstrate and validate economical new products from C6 sugars in a wet mill
M.1.5.1	Convert C6 sugars to products
M.1.5.2	Convert C6 sugars to building block chemicals
M.1.5.3	Convert building block chemicals to products
M.1.5.4	Demonstrate product separation and recovery specification
M.1.5.5	Validate integrated process at pilot scale
M.1.5.6	Validate new process in wet mill
M.1.6	Demonstrate and validate economical new products from corn-derived oils in a wet mill
M.1.6.1	Convert corn derived oils to products
M.1.6.2	Demonstrate product separation and recovery specification
M.1.6.3	Validate integrated process at pilot scale
M.1.6.4	Validate new process in wet mill
2. Dry Mill Improvements Pathway	
Milestone #	**Milestone Title**
M.2	***Complete systems level demonstration and validation of technologies to improve corn dry mill facilities using corn (or other) grain feedstock***
M.2.1	Demonstrate and validate economical residual starch conversion in a dry mill

M.2.1.1	Conversion of residual starch to glucose
M.2.1.2	Evaluate new feed product
M.2.1.3	Conversion of converted glucose to ethanol
M.2.1.4	Validate integrated process in a dry mill
M.2.2	Demonstrate and validate economical fiber conversion in a dry mill (residual starch also expected to be converted during fiber processing)
M.2.2.1	Convert fiber to monomer sugars
M.2.2.2	Evaluate new feed product
M.2.2.3	Validate integrated process at pilot scale
M.2.2.4	Validate new process in dry mill
M.2.3	Demonstrate and validate economical conversion of mixed sugars to ethanol in a dry mill
M.2.3.2	Convert released sugars to ethanol
M.2.3.4	Validate integrated process at pilot scale
M.2.3.5	Validate new process in dry mill
MI.1	Demonstrate and validate economical corn fiber-to-ethanol in a dry mill.
M.2.4	Demonstrate and validate economical conversion of mixed sugars to products in a dry mill
M.2.4.1	Conversion targets from C6 sugars to building blocks
M.2.4.2	Conversion targets from building blocks to products
M.2.4.3	Demonstrate product separation and recovery specification
M.2.4.4	Validate integrated process at pilot scale
M.2.4.5	Validate new process in dry mill
M.2.5	Demonstrate and validate economical new products from C6 sugars in a dry mill
M.2.5.1	Conversion targets from C6 sugars to building blocks
M.2.5.2	Conversion targets from building blocks to products
M.2.5.3	Product separation specification
M.2.5.4	Validate integrated process at pilot scale
M.2.5.5	Validate new process in dry mill
M.2.6	Demonstrate and validate economical front end fractionation processes in a dry mill
M.2.6.1	Derive additional value added products from front end fractionation
M.2.6.2	Evaluate new feed coproducts
M.2.6.3	Validate integrated process at pilot scale
M.2.6.4	Validate new process in dry mill
M.2.7	Investigate alternate sources for dry mill heat and power
M.2.7.1	Thermochemical processing of fiber stream to heat, power
M.2.7.2	Thermochemical processing of residues (i.e. corn stover) to heat, power
M.2.7.3	Validate integrated process at pilot scale
M.2.7.4	Validate new process in dry mill
3. Oil Mill Improvements Pathway	
Milestone #	**Milestone Title**
M.3	***Complete systems level demonstration and validation of technologies to improve oil processing mill facilities***
M.3.1	Demonstrate and validate economical and sustainable new oil crop production for production of biodiesel and other renewable diesel alternatives
M.3.1.1	Demonstrate sustainable agronomic practices
M.3.1.2	Demonstrate oil crop harvesting
M.3.1.3	Demonstrate oil crop storage
M.3.1.4	Demonstrate oil crop transportation

M.3.1.5	Demonstrate quality and quantity of oil crop available
M.3.1.6	Validate integrated oil crop logistics at pilot scale
M.3.1.7	Validate integrated oil crop logistics at demonstration scale
M.3.2	Demonstrate and validate economical new products from glycerol in a natural oil processing facility
M.3.2.1	Convert glycerol to products
M.3.2.2	Recover new products
M.3.2.3	Validate integrated process at pilot scale
M.3.2.4	Validate integrated process in natural oil processing facility
M.3.3	Demonstrate and validate economical new fuels from oils in natural oil processing facility
M.3.3.1	Convert oil to fuels
M.3.3.2	Recover fuels
M.3.3.3	Validate integrated process at pilot scale
M.3.3.4	Validate integrated process in natural oil processing facility
M.3.4	Demonstrate and validate economical new products from oils in natural oil processing facility
M.3.4.1	Convert oil to products
M.3.4.2	Convert oils to building block chemicals
M.3.4.3	Convert building block chemicals to products
M.3.4.4	Recover new products
M.3.4.5	Validate integrated process at pilot scale
M.3.4.6	Validate integrated process in natural oil processing facility
M.3.5	Demonstrate and validate economical cleanup of waste fats and greases for fuel production
M.3.5.1	Validate cleanup performance
M.3.5.2	Validate integrated cleanup at pilot scale
M.3.5.3	Validate integrated process in natural oil processing facility
4. Agricultural Residue Processing Pathway	
Milestone #	**Milestone Title**
M.4	***Complete systems level demonstration and validation of ~~all~~ key technologies to utilize agricultural residue feedstocks in existing or new facilities***
JI.2007	Complete preliminary engineering design package, market analysis, and financial projedctionfor at least two industrial-scale projects consistent with EPAct 2005 requirements.
JI.2008	Approve a final engineering design package of at least one commercial scale biorefinery (up to 700 metric tons per day of feedstock) including findings from an independent engineering review.
JI.2009	Complete engineering design package, market analysis and finanical projections for at least one industrial-scale biorefinery (1-3 MGY).
JI.2009	Initiate construction of at least one commerical-scale biorefinery project (700 tons/day feedstock) including hard orders for all tangible equiopment, vendor packages and structural steel.
JI.2010	Complete commissioning and preliminary operation of at least one commercial-scale biorefinery project (700 tons/day feedstock processed)
JI.2011	Complete constuction, mechanical completion, and commissioning of a 10% industrial scale biorefinery (1-3 million gallons/year) in support of nth plant economics at $1.31 (2007$) per gallon of ethanol by 2012.
JI.2011	Validate economics, system performance, of at least one commercial-scale biorefinery project (700 tons/day feedstock processed) awarded in FY2007 in support of nth plant economics at $1.31 per gallon of ethanol by 2012. (2007$)
JI.2012	Using commercial scale biorefinery and 10% industrial-scale biorefinery performance, validate nth plant economics at the $1.31/gal ethanol (2007$).
MI.6	Demonstrate and validate integrated agricultural residues-to-ethanol process at demonstration or commercial scale (Biochemical route)
MI.19	Demonstrate and validate production of ethanol from mixed alcohols produced from agricultural residues-derived syngas at demonstration or commercial scale.

JF.2008	Conduct replicated field trials across regions to determine the impact of residue removal on grain yield, and energy crops to assuess resource supply cost and potential and to optimize biorefinery location
JF.2009	Implement a GIS-based regional feedstock atlas system linked to the lateste National Agricultural Statistic Service data, energy crop field test resultes and residue removal trial results
JF.2010	Complete a core R&D engineering design that can receive multiple feedstock resources and preprocess them into cellulosic feedstock for an average of $35 per ton delivered to biorefineries.
JF.2011	In conjunction with USDA, land grant universities, and private sector, incorporate yield and othe data from field trials. Complete and validate dry and woody feedstocks at $35 per ton in line with 2012 goal.
JF.2012	Feedstocks (wet, dry, and woody) in support of $1.07 per gallon cost target will be validated on a regional basis.
M.4.1	Demonstrate and validate integrated corn stover harvesting logistics
M.4.1.1	Demonstrate sustainable corn agronomic practices that account for corn stover harvesting
M.4.1.2	Demonstrate wet and dry corn stover harvesting
M.4.1.3	Demonstrate wet and dry corn stover storage
M.4.1.4	Demonstrate wet and dry corn stover transportation
M.4.1.5	Demonstrate wet and dry quality and quantity of corn stover available
M.4.1.6	Demonstrate corn stover preprocessing benefits
M.4.1.7	Validate integrated corn stover logistics in prototype equipment
M.4.1.8	Validate integrated corn stover logistics at demonstration scale
M.4.2	Demonstrate and validate integrated wheat straw harvesting logistics
M.4.2.1	Demonstrate sustainable wheat agronomic practices that account for wheat straw harvesting
M.4.2.2	Demonstrate wet and dry wheat straw harvesting
M.4.2.3	Demonstrate wet and dry wheat straw storage
M.4.2.4	Demonstrate wet and dry wheat straw transportation
M.4.2.5	Demonstrate wet and dry quality and quantity of wheat straw available
M.4.2.6	Demonstrate wheat straw preprocessing benefits
M.4.2.7	Validate integrated wheat straw logistics in prototype equipment
M.4.2.8	Validate integrated wheat straw logistics at demonstration scale
M.4.3	Demonsrate and validate integrated rice straw harvesting logistics
M.4.3.1	Demonstrate sustainable rice agronomic practices that account for rice straw harvesting
M.4.3.2	Demonstrate wet and dry rice straw harvesting
M.4.3.3	Demonstrate wet and dry rice straw storage
M.4.3.4	Demonstrate wet and dry rice straw transportation
M.4.3.5	Demonstrate wet and dry quality and quantity of rice straw available
M.4.3.6	Demonstrate rice straw preprocessing benefits
M.4.3.7	Validate integrated rice straw logistics in prototype equipment
M.4.3.8	Validate integrated rice straw logistics at demonstration scale
M.4.4	Feedstock FlexIbility and Availability via Blending Depot or Elevator
M.4.4.1	To be determined
M.4.5	Demonstrate and validate ag residue fractionation to produce mixed, dilute biomass sugars
M.4.5.1	Validate cellulase enzyme cost
M.4.5.2	Validate pretreatment technology cost
M.4.5.3	Demonstrate ability to economically satisfy internal heat and power demands
M.4.5.4	Validate capital cost
M.4.5.5	Validate integrated pretreatment and enzymatic hydrolysis at pilot scale
M.4.5.6	Validate integrated pretreatment and enzymatic hydrolysis at demonstration scale
M.4.5.7	Validate feed flexibility in integrated system

M.4.6	Demonstrate and validate ethanol from 5 biomass sugars
M.4.6.1	Validate fermentation of all 5 sugars to produce ethanol
M.4.6.2	Optimize ethanol separation
M.4.6.3	Optimize integrated production of ethanol from sugars at pilot scale
M.4.6.4	Optimize integrated production of ethanol from sugars at demonstration scale
JB.2007	Complete integrated tests of pretreatment and enzymatic hydrolysis in conjunction with existing fermentation organisms at bench scale on corn stover that validate the $0.125 per pound sugars on the pathway to achieving $0.064 per pound in 2012.
JB.2010	Achieve 85% xylan-to-xylose conversion with chemical and/or enzymatic hydrolysis that contribute, via increased ethanol yield, to the $1.31 per gallon (2007$) selling price.
JB.2011	Data from integrated runs of pretreatment and enzymatic hydrolysis at lab scale combined with a process design and cost estimate validates that an integrated biorefinery potentially could produce ethanol at a $1.31 per gallon (2007$) selling price
MB.14	Validate integrated corn stover-to-ethanol pilot operation
JB.2012	Data from integrated pilot operation combined with process design and cot estimate validates a $1.31 per gallon (2007$) selling price.
M.4.7	Demonstrate and validate chemical building blocks, chemicals or materials from 5 biomass sugars
M.4.7.1	Optimize chemical building blocks production
M.4.7.2	Optimize high value chemical production
M.4.7.3	Optimize product separation
M.4.7.4	Optimize integrated production of product(s) from sugars at pilot scale
M.4.7.5	Optimize integrated production of product(s)from sugars at demonstration scale
M.4.8	Demonstrate and validate high value chemical and material products from lignin intermediates
M.4.8.1	Demonstrate high value chemical/material production from lignin
M.4.8.2	Validate product separation
M.4.8.3	Validate integrated production of product(s)from lignin at pilot scale
M.4.8.4	Validate integrated production of product(s)from lignin at demonstration scale
M.4.9	Demonstrate and validate fuel products from lignin intermediates
M.4.9.1	Demonstrate direct fuel production from lignin
M.4.9.2	Validate fuel product separation
M.4.9.3	Validate integrated production of fuel(s)from lignin at pilot scale
M.4.9.4	Validate integrated production of fuels(s)from lignin at demonstration scale
M.4.10	Demonstrate and validate combined heat and power from lignin intermediates/residues
M.4.10.1	Demonstrate combined heat and power production from lignin
M.4.10.2	Validate integrated production of heat and power from lignin at pilot scale
M.4.10.3	Validate integrated production of heat and power from lignin at demonstration scale
M.4.11	Demonstrate and validate lignin gasification to produce syngas
M.4.11.1	Validate feeder system performance
M.4.11.2	Validate gasification performance
M.4.11.3	Validate gas cleanup performance
M.4.11.4	Validate capital costs
M.4.11.5	Validate integrated gasification and gas cleanup at pilot scale
M.4.11.6	Validate integrated gasification and gas cleanupat demonstration scale
M.4.12	Demonstrate and validate biomass gasification to produce syngas
M.4.12.1	Validate feeder systems to reliably feed solid biomass to high pressure (30 bar) systems
M.4.12.2	Validate gasification performance
M.4.12.3	Validate gas cleanup performance
M.4.12.4	Validate capital costs
M.4.12.5	Validate integrated gasification and gas cleanup at pilot scale

M.4.12.6	Validate integrated gasification and gas cleanupat demonstration scale
M.4.12.7	Validate feed flexibility in integrated system
JT.2007	Demonstrate conversion of 50% of non-methane (C2+ higher) hydrocarbons that result in a syngas cost of $7.15/MBtu in 2007.
JT.2009	Validate technology capable of economically converting biomass residues, pulping liquors or waste fats and greases to synthesis gas or bio-oils that are suitable for fuels and chemicals produciton. The target is a modeled cost of $5.81/Mbtu in 2009.
JT.2010	Validate and demonstrate technology for the cost-effective cleanup of biomass synthesis gas leading to a modeled syngas cost of $5.40/Mbtu in 2010.
M.4.13	Demonstrate and validate ethanol from mixed alcohols using lignin or biomass derived syngas
M.4.13.1	Demonstrate ethanol production from mixed alcohols
M.4.13.2	Validate ethanol separation
M.4.13.3	Validate integrated production of ethanol from syngas at pilot scale
M.4.13.4	Validate integrated production of ethanol from syngas at demonstration scale
MT.19	Validate integrated corn stover/wheat straw-to-ethanol (via gasification) pilot operation.
M.4.14	Demonstrate and validate hydrogen production from lignin or biomass derived syngas
M.4.14.1	Demonstrate optimized hydrogen production from syngas
M.4.14.2	Validate hydrogen separation/recovery
M.4.14.3	Validate integrated production of hydrogen from syngas at pilot scale
M.4.14.4	Validate integrated production of hydrogen from syngas at demonstration scale
M.4.15	Demonstrate and validate combined heat and power production from lignin or biomass derived syngas
M.4.15.1	Demonstrate combined heat and power production from syngas
M.4.15.2	Validate integrated production of heat and power from syngas at pilot scale
M.4.15.3	Validate integrated production of heat and power from syngas at demonstration scale
M.4.16	Demonstrate and validate non-ethanol fuels from lignin or biomass derived syngas
M.4.16.1	Demonstrate non-ethanol fuel production from lignin or biomass-derived syngas
M.4.16.2	Validate non-ethanol fuel separation
M.4.16.3	Validate integrated production of non-ethanol fuels from syngas at pilot scale
M.4.16.4	Validate integrated production of non-ethanol fuels from syngas at demonstration scale
M.4.17	Demonstrate and validate product(s) from lignin or biomass derived syngas
M.4.17.1	Demonstrate high value chemical/material production (C3-C5 alcohols) from syngas
M.4.17.2	Validate product(s) separation
M.4.17.3	Validate integrated production of product(s) from syngas at pilot scale
M.4.17.4	Validate integrated production of product(s) from syngas at demonstration scale
M.4.18	Demonstrate and validate non-ethanol fuels from 5 biomass sugars that are econonomically viable
M.4.18.1	Validate fermentation of all 5 sugars to produce non-ethanol fuels
M.4.18.2	Optimize non-ethanol fuel separation
M.4.18.3	Optimize integrated production of non-ethanol fuels from sugars at pilot scale
M.4.18.4	Optimize integrated production of non-ethanol fuel from sugars at demonstration scale
M.4.19	Demonstrate and validate biomass pyrolysis to produce pyrolysis oil intermediate
M.4.19.1	Validate feeder systems to reliably feed solid biomass to pyrolysis reactor high pressure (30 bar) systems
M.4.19.2	Validate pyrolysis performance
M.4.19.3	Validate pyrolysis oil cleanup performance
M.4.19.4	Validate capital costs - ROI hurdle rate versus cost magnitude hurdle amount
M.4.19.5	Validate integrated pyrolysis and pyrolysis oil cleanup at pilot scale
M.4.19.6	Validate integrated pyrolysis and pyrolysis oil cleanup at demonstration scale
M.4.19.7	Validate feed flexibility in integrated system
M.4.20	Demonstrate and validate fuels from pyrolysis oil intermediate

M.4.20.1	Demonstrate fuel production from pyrolysis oil intermediate
M.4.20.2	Validate fuel separation
M.4.20.3	Validate integrated production of fuels from pyrolysis oil at pilot scale
M.4.20.4	Validate integrated production of fuels from pyrolysis oil at demonstration scale
M.4.21	Demonstrate and validate high value chemical and material products from pyrolysis oil intermediates
M.4.21.1	Demonstrate high value chemical/material production from pyrolysis oil
M.4.21.2	Validate product separation
M.4.21.3	Validate integrated production of product(s)from pyrolysis oil at pilot scale
M.4.21.4	Validate integrated production of product(s)from pyrolysis oil at demonstration scale
5. Perennial Crop Processing Pathway Milestones	
Milestone #	**Milestone Title**
M.5	***Complete systems level demonstration and validation of ~~all~~ key technologies to utilize perennial crops in existing or new facilities***
JF.2008	Conduct replicated field trials across regions to determine the impact of residue removal on grain yield, and energy crops to assuess resource supply cost and potential and to optimize biorefinery location
JF.2009	Implement a GIS-based regional feedstock atlas system linked to the latest National Agricultural Statistic Service data, energy crop field test resultes and residue removal trial results
JF.2010	Incorporate new varieties/clones developed at land grants, universities and private sector into regionally-based field trial sites. Update GIS system with new information obtained from trials and initiate new trials for post-2012 timeframe.
JF.2010	Complete a core R&D engineering design that can receive multiple feedstock resources and preprocess them into cellulosic feedstock for an average of $35 per ton delivered to biorefineries.
JF.2011	In conjunction with USDA, land grant universities, and private sector, incorporate yield and othe data from field trials. Complete and validate dry and woody feedstocks at $35 per ton in line with 2012 goal.
JF.2012	Feedstocks (wet, dry, and woody) in support of $1.07 per gallon cost target will be validated on a regional basis.
M.5.1	Demonstrate and validate integrated switchgrass production and harvesting logistics
M.5.1.1	Demonstrate sustainable switchgrass agronomic practices
M.5.1.2	Demonstrate wet and dry switchgrass harvesting
M.5.1.3	Demonstrate wet and dry switchgrass storage
M.5.1.4	Demonstrate wet and dry switchgrass transportation
M.5.1.5	Demonstrate quality and quantity of switchgrass available
M.5.1.6	Demonstrate switchgrass prepprocessing benefits
M.5.1.7	Validate integrated switchgrass logistics in prototype equipment
M.5.1.8	Validate integrated switchgrass logistics at demonstration scale
M.5.2	Demonstrate and validate integrated woody crop harvesting logistics
M.5.2.1	Demonstrate sustainable woody crop agronomic practices
M.5.2.2	Demonstrate woody crop harvesting
M.5.2.3	Demonstrate woody crop storage
M.5.2.4	Demonstrate woody crop transportation
M.5.2.5	Demonstrate quality and quantity of woody crops available
M.5.2.6	Demonstrate woody crop preprocessing benefits
M.5.2.7	Validate integrated woody crop logistics in prototype equipment
M.5.2.8	Validate integrated woody crop logistics at demonstration scale
M.5.3	Feedstock FlexIbility and Availability via Blending Depot or Elevator
M.5.3.1	To be determined
M.5.4	Demonstrate and validate switchgrass fractionation to produce mixed biomass sugars
M.5.4.1	Validate cellulase enzyme cost
M.5.4.2	Validate pretreatment technology cost

M.5.4.3	Demonstrate ability to economically satisfy internal heat and power demands
M.5.4.4	Validate capital cost
M.5.4.5	Validate integrated pretreatment and enzymatic hydrolysis at pilot scale
M.5.4.6	Validate integrated pretreatment and enzymatic hydrolysis at demonstration scale
M.5.4.7	Validate feed flexibility in integrated system
JB.2008	Achieve a modeled cost target of $0.11 per pound of sugars (equivalent to $2.09 per gallon of cellulosic ethanol) through the formulation of improved enzyme mixtures and pretreatments.
JB.2009	Demonstrate alternative pretreatment technologies integrated with enzymatic hydrolysis at lab scale that have the potential of contributing ot the $1.31 per gallon (2007$) ethanol selling price target in 2012.
M.5.5	Demonstrate and validate woody crop fractionation to produce mixed, dilute biomass sugars
M.5.5.1	Validate cellulase enzyme cost
M.5.5.2	Validate pretreatment technology cost
M.5.5.3	Demonstrate ability to economically satisfy internal heat and power demands
M.5.5.4	Valicate capital cost
M.5.5.5	Validate integrated pretreatment and enzymatic hydrolysis at pilot scale
M.5.5.6	Validate integrated pretreatment and enzymatic hydrolysis at demonstration scale
M.5.5.7	Validate feed flexibility in integrated system
MB.15	Validate integrated switchgrass-to-ethanol pilot operation
M.5.6	Demonstrate and validate ethanol from 5 biomass sugars
M.5.6.1	Validate ethanol production
M.5.6.2	Validate ethanol separation/recovery
M.5.6.3	Validate integrated production of product(s)from sugars at pilot scale
M.5.6.4	Validate integrated production of product(s)from sugars at demonstration scale
M.5.7	Demonstrate and validate products from 5 biomass sugars
M.5.7.1	Validate chemical building blocks production
M.5.7.2	Validate high value chemical production
M.5.7.3	Validate product separation
M.5.7.4	Validate integrated production of product(s)from sugars at pilot scale
M.5.7.5	Validate integrated production of product(s)from sugars at demonstration scale
M.5.8	Demonstrate and validate high value chemical and material products from lignin intermediates
M.5.8.1	Demonstrate high value chemical/material production from lignin
M.5.8.2	Validate product separation
M.5.8.3	Validate integrated production of product(s)from lignin at pilot scale
M.5.8.4	Validate integrated production of product(s)from lignin at demonstration scale
M.5.9	Demonstrate and validate fuel products from lignin intermediates
M.5.9.1	Demonstrate direct fuel production from lignin
M.5.9.2	Validate fuel product separation
M.5.9.3	Validate integrated production of fuel(s)from lignin at pilot scale
M.5.9.4	Validate integrated production of fuels(s)from lignin at demonstration scale
M.5.10	Demonstrate and validate combined heat and power from lignin intermediates/residues
M.5.10.1	Demonstrate combined heat and power production from lignin
M.5.10.2	Validate integrated production of heat and power from lignin at pilot scale
M.5.10.3	Validate integrated production of heat and power from lignin at demonstration scale
M.5.11	Demonstrate and validate lignin gasification to produce syngas
M.5.11.1	Validate feeder system performance
M.5.11.2	Validate gasification performance

M.5.11.3	Validate gas cleanup performance
M.5.11.4	Validate capital costs - ROI hurdle rate versus cost magnitude hurdle amount
M.5.11.5	Validate integrated gasification and gas cleanup at pilot scale
M.5.11.6	Validate integrated gasification and gas cleanup at demonstration scale
M.5.12	Demonstrate and validate biomass gasification to produce syngas
M.5.12.1	Validate feeder systems to reliably feed solid biomass to high pressure (30 bar) systems
M.5.12.2	Validate gasification performance
M.5.12.3	Validate gas cleanup performance
M.5.12.4	Validate capital costs
M.5.12.5	Validate integrated gasification and gas cleanup at pilot scale
M.5.12.6	Validate integrated gasification and gas cleanupat demonstration scale
M.5.12.7	Validate feed flexibility in integrated system
JT.2007	Demonstrate conversion of 50% of non-methane (C2+ higher) hydrocarbons that result in a syngas cost of $7.15/MBtu in 2007.
JT.2010	Validate and demonstrate technology for the cost-effective cleanup of biomass synthesis gas leading to a modeled syngas cost of $5.40/Mbtu in 2010.
M.5.13	Demonstrate and validate ethanol from mixed alcohols using lignin or biomass derived syngas
M.5.13.1	Demonstrate ethanol production from mixed alcohols
M.5.13.2	Validate ethanol separation
M.5.13.3	Validate integrated production of ethanol from syngas at pilot scale
M.5.13.4	Validate integrated production of ethanol from syngas at demonstration scale
MT.20	Validate integrated switchgrass/hybrid poplar-to-ethanol (via gasification) pilot operation.
M.5.14	Demonstrate and validate hydrogen production from lignin or biomass derived syngas
M.5.14.1	Demonstrate optimized hydrogen production from syngas
M.5.14.2	Validate hydrogen separation/recovery
M.5.14.3	Validate integrated production of hydrogen from syngas at pilot scale
M.5.14.4	Validate integrated production of hydrogen from syngas at demonstration scale
M.5.15	Demonstrate and validate combined heat and power production from lignin or biomass derived syngas
M.5.15.1	Demonstrate combined heat and power production from syngas
M.5.15.2	Validate integrated production of heat and power from syngas at pilot scale
M.5.15.3	Validate integrated production of heat and power from syngas at demonstration scale
M.5.16	Demonstrate and validate non-ethanol fuels from lignin or biomass derived syngas
M.5.16.1	Demonstrate non-ethanol fuel production from lignin or biomass-derived syngas
M.5.16.2	Validate non-ethanol fuel separation
M.5.16.3	Validate integrated production of non-ethanol fuels from syngas at pilot scale
M.5.16.4	Validate integrated production of non-ethanol fuels from syngas at demonstration scale
M.5.17	Demonstrate and validate product(s) from lignin or biomass derived syngas
M.5.17.1	Demonstrate high value chemical/material production (C3-C5 alcohols) from syngas
M.5.17.2	Validate product(s) separation
M.5.17.3	Validate integrated production of product(s) from syngas at pilot scale
M.5.17.4	Validate integrated production of product(s) from syngas at demonstration scale
M.5.18	Demonstrate and validate non-ethanol fuels from 5 biomass sugars that are econonomically viable
M.5.18.1	Validate fermentation of all 5 sugars to produce non-ethanol fuels
M.5.18.2	Optimize non-ethanol fuel separation
M.5.18.3	Optimize integrated production of non-ethanol fuels from sugars at pilot scale
M.5.18.4	Optimize integrated production of non-ethanol fuel from sugars at demonstration scale
M.5.19	Demonstrate and validate biomass pyrolysis to produce pyrolysis oil intermediate

M.5.19.1	Validate feeder systems to reliably feed solid biomass to pyrolysis reactor high pressure (30 bar) systems
M.5.19.2	Validate pyrolysis performance
M.5.19.3	Validate pyrolysis oil cleanup performance
M.5.19.4	Validate capital costs - ROI hurdle rate versus cost magnitude hurdle amount
M.5.19.5	Validate integrated pyrolysis and pyrolysis oil cleanup at pilot scale
M.5.19.6	Validate integrated pyrolysis and pyrolysis oil cleanup at demonstration scale
M.5.19.7	Validate feed flexibility in integrated system
M.5.20	Demonstrate and validate fuels from pyrolysis oil intermediate
M.5.20.1	Demonstrate fuel production from pyrolysis oil intermediate
M.5.20.2	Validate fuel separation
M.5.20.3	Validate integrated production of fuels from pyrolysis oil at pilot scale
M.5.20.4	Validate integrated production of fuels from pyrolysis oil at demonstration scale
M.5.21	Demonstrate and validate high value chemical and material products from pyrolysis oil intermediates
M.5.21.1	Demonstrate high value chemical/material production from pyrolysis oil
M.5.21.2	Validate product separation
M.5.21.3	Validate integrated production of product(s)from pyrolysis oil at pilot scale
M.5.21.4	Validate integrated production of product(s)from pyrolysis oil at demonstration scale
6. Forest Resources Processing	
Milestone #	**Milestone Title**
M.6	***Complete systems level demonstration and validation of technologies to improve pulp and paper mill facilities and/or produce additional products (fuels, chemicals and /or power) from wood feedstock in a pulp and paper mill environment***
JF.2010	Complete a core R&D engineering design that can receive multiple feedstock resources and preprocess them into cellulosic feedstock for an average of $35 per ton delivered to biorefineries.
JF.2011	In conjunction with USDA, land grant universities, and private sector, incorporate yield and othe data from field trials. Complete and validate dry and woody feedstocks at $35 per ton in line with 2012 goal.
JF.2012	Feedstocks (wet, dry, and woody) in support of $1.07 per gallon cost target will be validated on a regional basis.
M.6.1	Demonstrate and validate integrated logging residue and forest thinnings collection and logistics
M.6.1.1	Demonstrate sustainable logging practices
M.6.1.2	Demonstrate logging residue collection
M.6.1.3	Demonstrate forest thinnings collection
M.6.1.4	Demonstrate logging residue and forest thinnings transportation
M.6.1.5	Demonstrate quality and quantity of logging residue and forest thinnings available
M.6.1.6	Demonstrate logging residue and forest thinnings preprocessing benefits
M.6.1.7	Validate integrated logging residue and forest thinnings logistics in prototype equipment
M.6.1.8	Validate integrated logging residue and forest thinnings logistics at demonstration scale
M.6.2	Demonstrate and validate integrated fuel treatment biomass collection and logistics
M.6.2.1	Demonstrate fuel treatment biomass collection
M.6.2.2	Demonstrate fuel treatment biomass storage
M.6.2.3	Demonstrate fuel treatment biomass transportation
M.6.2.4	Demonstrate fuel treatment biomass quality and quantity of available
M.6.2.5	Demonstrate fuel treatment biomass preprocessing benefits
M.6.2.6	Validate integrated fuel treatment biomass logistics in prototype equipment
M.6.2.7	Validate integrated fuel treatment biomass logistics at demonstration scale
M.6.3	Demonstrate and validate forest resources fractionation to produce mixed, dilute biomass sugars
M.6.3.1	Validate cellulase enzyme cost

M.6.3.2	Validate pretreatment technology cost
M.6.3.3	Demonstrate ability to economically satisfy internal heat and power demands
M.6.3.4	Validate capital cost
M.6.3.5	Validate integrated pretreatment and enzymatic hydrolysis at pilot scale
M.6.3.6	Validate integrated pretreatment and enzymatic hydrolysis at demonstration scale
M.6.3.7	Validate feed flexibility in integrated system
M.6.4	Demonstrate and validate ethanol from 5 biomass sugars
M.6.4.1	Validate fermentation of all 5 sugars to produce ethanol
M.6.4.2	Optimize ethanol separation
M.6.4.3	Optimize integrated production of ethanol from sugars at pilot scale
M.6.4.4	Optimize integrated production of ethanol from sugars at demonstration scale
M.6.5	Demonstrate and validate non-ethanol fuels from 5 biomass sugars
M.6.5.1	Validate fermentation of all 5 sugars to produce non-ethanol fuels
M.6.5.2	Optimize fuel separation
M.6.5.3	Optimize integrated production of non-ethanol fuels from sugars at pilot scale
M.6.5.4	Optimize integrated production of non-ethanol fuels from sugars at demonstration scale
M.6.6	Demonstrate and validate chemical building blocks, chemicals or materials from 5 biomass sugars
M.6.6.1	Optimize chemical building blocks production
M.6.6.2	Optimize high value chemical production
M.6.6.3	Optimize product separation
M.6.6.4	Optimize integrated production of product(s) from sugars at pilot scale
M.6.6.5	Optimize integrated production of product(s) from sugars at demonstration scale
M.6.7	Demonstrate and validate fuel products from lignin intermediates
M.6.7.1	Demonstrate direct fuel production from lignin
M.6.7.2	Validate fuel product separation
M.6.7.3	Validate integrated production of fuel(s) from lignin at pilot scale
M.6.7.4	Validate integrated production of fuels(s) from lignin at demonstration scale
M.6.8	Demonstrate and validate high value chemical and material products from lignin intermediates
M.6.8.1	Demonstrate high value chemical/material production from lignin
M.6.8.2	Validate product separation
M.6.8.3	Validate integrated production of product(s) from lignin at pilot scale
M.6.8.4	Validate integrated production of product(s) from lignin at demonstration scale
M.6.9	Demonstrate and validate combined heat and power from lignin intermediates/residues
M 6.9.1	Demonstrate combined heat and power production from lignin
M 6.9.2	Validate integrated production of heat and power from lignin at pilot scale
M 6.9.3	Validate integrated production of heat and power from lignin at demonstration scale
M 6.10	Demonstrate and validate lignin gasification to produce syngas
M 6.10.1	Validate feeder system performance
M 6.10.2	Validate gasification performance
M 6.10.3	Validate gas cleanup performance
M 6.10.4	Validate capital cost
M 6.10.5	Validate integrated gasification and gas cleanup at pilot scale
M 6.10.6	Validate integrated gasification and gas cleanup at demonstration scale
M 6.11	Demonstrate and validate cost-effective biomass gasification of wood, forest residues and other process residues and synthesis gas cleanup in a forest resources mill environment
M 6.11.1	Develop cost effective gasification designs for syngas production at appropriate scale

M 6.11.2	Validate feeder system performance to reliably feed solids to high pressure (30 bar) systems)
M 6.11.3	Validate gasification performance
M 6.11.4	Validate cost-effective gas cleanup performance
M 6.11.5	Validate integrated biomass gasification and syngas cleanup process at pilot scale
M 6.11.6	Validate integrated biomass gasification and syngas cleanup process in a forest resources mill environment
	Validate feed flexibility in integrated system
JT.2007	Demonstrate conversion of 50% of non-methane (C2+ higher) hydrocarbons that result in a syngas cost of $7.15/MBtu in 2007.
JT.2009	Validate technology capable of economically converting biomass residues, pulping liquors or waste fats and greases to synthesis gas or bio-oils that are suitable for fuels and chemicals produciton. The target is a modeled cost of $5.81/Mbtu in 2009.
JT.2010	Validate and demonstrate technology for the cost-effective cleanup of biomass synthesis gas leading to a modeled syngas cost of $5.40/Mbtu in 2010.
M 6.12	Demonstrate and validate production of ethanol from syngas in a forest resources mill environment
M 6.12.1	Produce mixed alcohols from syngas
M 6.12.2	Recover ethanol fuel product
M 6.12.3	Validate integrated process at pilot scale
M 6.12.4	Validate new process in a forest resources mill environment
M 6.13	Demonstrate and validate production of non-ethanol fuels from syngas in a forest resources mill environment
M 6.13.1	Produce non-ethanol fuel from biomass syngas
M 6.13.2	Recover fuel product
M 6.13.3	Validate integrated process at pilot scale
M 6.13.4	Validate new process in a forest resources mill environment
M 6.14	Demonstrate and validate hydrogen production from lignin or biomass derived syngas forest resources mill environment
M 6.14.1	Demonstrate optimized hydrogen production from syngas
M 6.14.2	Validate hydrogen separation/recovery
M 6.14.3	Validate integrated production of hydrogen from syngas at pilot scale
M 6.14.4	Validate integrated production of hydrogen from syngas at demonstration scale
M 6.15	Demonstrate and validate product(s) from lignin or biomass derived syngas forest resources mill environment
M 6.15.1	Demonstrate high value chemical/material productionfrom syngas
M 6.15.2	Validate product(s) separation
M 6.15.3	Validate integrated production of product(s) from syngas at pilot scale
M 6.15.4	Validate integrated production of product(s) from syngas at demonstration scale
M 6.16	Demonstrate and validate syngas utilization for combined heat and power in a forest resources mill environment
M 6.16.1	Verify fuel gas quality to levels necessary for CHP or clean cold gas consuming equipment
M 6.16.2	Validate CHP from syngas and/or direct use of sygas in process equipment
M 6.16.3	Validate integrated process at pilot scale
M 6.16.4	Validate new process in a forest resources mill environment
M 6.17	Demonstrate and validate bio-oil production to a stable intermediate forest resources mill environment
M 6.17.1	Validate bio-oil production
M 6.17.2	Validate bio-oil inermediate recovery
M 6.17.3	Validate integrated process for producing bio-oil at pilot scale
M 6.17.4	Demonstrate and validate new process in a forest resources mill environment
M 6.17.5	Validate feed flexibility in integrated system
M 6.18.	Achieve cost-effective conversion bio-oil intermediate into product(s) in a forest resources mill environment
M 6.18.1	Validate production of products from bio-oil
M 6.18.2	Validate bio-oil product(s) recovery
M 6.18.3	Validate integrated process for producing bio-oil product at pilot scale

M 6.18.4	Validate integrated process in a forest resources mill environment
M 6.19.	Achieve cost-effective conversion bio-oil intermediate into product(s) in a forest resources mill environment
M 6.19.1	Validate production of products from bio-oil
M 6.19.2	Validate bio-oil product(s) recovery
M 6.19.3	Validate integrated process for producing bio-oil product at pilot scale
M 6.19.4	Validate integrated process in a forest resources mill environment
M 6.20	Demonstrate and validate cost-effective extraction of C5 and C6 sugars from hemicellulose upstream of the pulp digestor in a pulp mill without negatively impacting paper quality
M 6.20.1	Meet yield target for C5 and C6 sugars without negatively impacting paper quality
M 6.20.2	Meet sugar upgrading requirements
M 6.20.3	Meet targets for recovery of other intermediates
M 6.20.4	Validate integrated sugar extraction process at pilot scale
M 6.20.5	Validate sugar extraction process in pulp and paper mill
M 6.21	Demonstrate and validate reliable and economic gasification of spent pulping liquor, recycle liquor causticization, chemical recovery and gas cleanup in a pulp mill
M 6.21.1	Validate reliable and economic performance of gasification of spent pulping liquor
M 6.21.2	Validate cost effective causticization and return Na based pulping chemicals
M 6.21.3	Validate advantages of co-gasification of spent pulping liquors and other forms of biomass (woody, recycle paper streams, and bio-oil)
M 6.21.4	Validate process chemical recovery from spent pulping liquor syngas
M 6.21.5	Validategas cleanup technologies on spent pulping liquor syngas
M 6.21.6	Validate integrated black liquor gasification, causticization, chemical recovery and gas cleanup process at pilot scale
M 6.21.7	Validate integrated black liquor gasification, causticization, chemical recovery and gas cleanup process in pulp and paper mill
JB.2011	Demonstrate the conversion of synthesis gas or bio-oils, derived from biomass pulping liquors or waste fats and greases to chemicals or transportation fuels. The target modeled cost is $5.25/Mbtu in 2011.
7. Waste Processing Pathway	
Milestone #	**Milestone Title**
M.7	***Complete systems level demonstration and validation of technologies to process waste biomass streams to produce fuels, chemicals and /or power.***
M.7.1	Demonstrate and validate fractionation of carbohydrate rich waste streams to produce mixed, dilute biomass sugars
M.7.1.1	Validate cellulase enzyme cost
M.7.1.2	Validate pretreatment technology cost
M.7.1.3	Demonstrate ability to economically satisfy internal heat and power demands
M.7.1.4	Validate capital cost
M.7.1.5	Validate integrated pretreatment and enzymatic hydrolysis at pilot scale
M.7.1.6	Validate integrated pretreatment and enzymatic hydrolysis at demonstration scale
M.7.1.7	Validate feed flexibility in integrated system
M.7.2	Demonstrate and validate ethanol from 5 biomass sugars
M.7.2.1	Validate fermentation of all 5 sugars to produce ethanol
M.7.2.2	Optimize ethanol separation
M.7.2.3	Optimize integrated production of ethanol from sugars at pilot scale
M.7.2.4	Optimize integrated production of ethanol from sugars at demonstration scale
M.7.3	Demonstrate and validate non-ethanol fuels from 5 biomass sugars
M.7.3.1	Validate fermentation of all 5 sugars to produce non-ethanol fuels
M.7.3.2	Optimize non-ethanol fuel separation
M.7.3.3	Optimize integrated production of non-ethanol fuels from sugars at pilot scale

M.7.3.4	Optimize integrated production of non-ethanol fuel from sugars at demonstration scale
M.7.4	Demonstrate and validate chemical building blocks, chemicals or materials from 5 biomass sugars
M.7.4.1	Optimize chemical building blocks production
M.7.4.2	Optimize high value chemical production
M.7.4.3	Optimize product separation
M.7.4.4	Optimize integrated production of product(s)from sugars at pilot scale
M.7.4.5	Optimize integrated production of product(s)from sugars at demonstration scale
M.7.6	Demonstrate and validate high value chemical and material products from lignin intermediates
M.7.6.1	Demonstrate high value chemical/material production from lignin
M.7.6.2	Validate product separation
M.7.6.3	Validate integrated production of product(s)from lignin at pilot scale
M.7.6.4	Validate integrated production of product(s)from lignin at demonstration scale
M.7.5	Demonstrate and validate fuel products from lignin intermediates
M.7.5.1	Demonstrate direct fuel production from lignin
M.7.5.2	Validate fuel product separation
M.7.5.3	Validate integrated production of fuel(s)from lignin at pilot scale
M.7.5.4	Validate integrated production of fuels(s)from lignin at demonstration scale
M.7.7	Demonstrate and validate combined heat and power from lignin intermediates/residues
M.7.7.1	Demonstrate combined heat and power production from lignin
M.7.7.2	Validate integrated production of heat and power from lignin at pilot scale
M.7.7.3	Validate integrated production of heat and power from lignin at demonstration scale
M.7.8	Demonstrate and validate lignin gasification to produce syngas
M.7.8.1	Validate feeder system performance
M.7.8.2	Validate gasification performance
M.7.8.3	Validate gas cleanup performance
M.7.8.4	Validate capital costs
M.7.8.5	Validate integrated gasification and gas cleanup at pilot scale
M.7.8.6	Validate integrated gasification and gas cleanupat demonstration scale
M.7.9	Demonstrate and validate waste biomass gasification to produce syngas
M.7.9.1	Validate feeder systems to reliably feed solid biomass to high pressure (30 bar) systems
M.7.9.2	Validate gasification performance
M.7.9.3	Validate gas cleanup performance
M.7.9.4	Validate capital costs
M.7.9.5	Validate integrated gasification and gas cleanup at pilot scale
M.7.9.6	Validate integrated gasification and gas cleanupat demonstration scale
M.7.9.7	Validate feed flexibility in integrated system
JT.2009	Validate technology capable of economically converting biomass residues, pulping liquors or waste fats and greases to synthesis gas or bio-oils that are suitable for fuels and chemicals produciton. The target is a modeled cost of $5.81/Mbtu in 2009.
M.7.10	Demonstrate and validate ethanol from mixed alcohols using lignin or waste biomass derived syngas
M.7.10.1	Demonstrate ethanol production from mixed alcohols
M.7.10.2	Validate ethanol separation
M.7.10.3	Validate integrated production of ethanol from syngas at pilot scale
M.7.10.4	Validate integrated production of ethanol from syngas at demonstration scale
JB.2011	Demonstrate the conversion of synthesis gas or bio-oils, derived from biomass pulping liquors or waste fats and greases to chemicals or transportation fuels. The target modeled cost is $5.25/Mbtu in 2011.
M.7.11	Demonstrate and validate non-ethanol fuels from lignin or waste biomass derived syngas

M.7.11.1	Demonstrate non-ethanol fuel production from lignin or biomass-derived syngas
M.7.11.2	Validate non-ethanol fuel separation
M.7.11.3	Validate integrated production of non-ethanol fuels from syngas at pilot scale
M.7.11.4	Validate integrated production of non-ethanol fuels from syngas at demonstration scale
M.7.12	Demonstrate and validate hydrogen production from lignin or waste biomass derived syngas
M.7.12.1	Demonstrate optimized hydrogen production from syngas
M.7.12.2	Validate hydrogen separation/recovery
M.7.12.3	Validate integrated production of hydrogen from syngas at pilot scale
M.7.12.4	Validate integrated production of hydrogen from syngas at demonstration scale
M.7.13	Demonstrate and validate product(s) from lignin or waste biomass derived syngas
M.7.13.1	Demonstrate high value chemical/material production from syngas
M.7.13.2	Validate product(s) separation
M.7.13.3	Validate integrated production of product(s) from syngas at pilot scale
M.7.13.4	Validate integrated production of product(s) from syngas at demonstration scale
M.7.14	Demonstrate and validate combined heat and power production from lignin or waste biomass derived syngas
M.7.14.1	Demonstrate combined heat and power production from syngas
M.7.14.2	Validate integrated production of heat and power from syngas at pilot scale
M.7.14.3	Validate integrated production of heat and power from syngas at demonstration scale
M.7.15	Demonstrate and validate waste biomass pyrolysis to produce pyrolysis oil intermediate
M.7.15.1	Validate feeder systems to reliably feed solid biomass to pyrolysis reactor high pressure (30 bar) systems
M.7.15.2	Validate pyrolysis performance
M.7.15.3	Validate pyrolysis oil cleanup performance
M.7.15.4	Validate capital costs
M.7.15.5	Validate integrated pyrolysis and pyrolysis oil cleanup at pilot scale
M.7.15.6	Validate integrated pyrolysis and pyrolysis oil cleanup at demonstration scale
M.7.15.7	Validate feed flexibility in integrated system
M.7.16	Demonstrate and validate fuels from pyrolysis oil intermediate
M.7.16.1	Demonstrate fuel production from pyrolysis oil intermediate
M.7.16.2	Validate fuel separation
M.7.16.3	Validate integrated production of fuels from pyrolysis oil at pilot scale
M.7.16.4	Validate integrated production of fuels from pyrolysis oil at demonstration scale
M.7.17	Demonstrate and validate high value chemical and material products from pyrolysis oil intermediates
M.7.17.1	Demonstrate high value chemical/material production from pyrolysis oil
M.7.17.2	Validate product separation
M.7.17.3	Validate integrated production of product(s)from pyrolysis oil at pilot scale
M.7.17.4	Validate integrated production of product(s)from pyrolysis oil at demonstration scale

Sapphire Energy IABR Project Schedule

Activity ID	PMP	Activity Name	Start	Finish	FY2010				FY2011				FY2012				FY2013				FY2014				FY2015		
					FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3

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Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Start Constraint
Finish Constraint
Milestone
% Complete
Summary

Sapphire Energy

Sapphire Energy IABR Project Schedule

Activity ID	PMP	Activity Name	Start	Finish	FY2010				FY2011				FY2012				FY2013				FY2014				FY2015		
					FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3

Redacted Exemption 4

Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Start Constraint
Finish Constraint
Milestone
% Complete
Summary

Sapphire Energy

Sapphire Energy IABR Project Schedule

Activity ID	PMP	Activity Name	Start	Finish	FY2010				FY2011				FY2012				FY2013				FY2014				FY2015		
					FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3

Redacted Exemption 4

Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Start Constraint
Finish Constraint
Milestone
% Complete
Summary

Sapphire Energy

Sapphire Energy IABR Project Schedule

Activity ID	PMP	Activity Name	Start	Finish	FY2010				FY2011				FY2012				FY2013				FY2014				FY2015		
					FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3	FQ4	FQ1	FQ2	FQ3

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Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Start Constraint
Finish Constraint
Milestone
% Complete
Summary

Sapphire Energy

Sapphire Energy IABR Project WBS

WBS Code	WBS Name

Redacted Exemption 4

WBS Code	WBS Name

Redacted Exemption 4

Sapphire Energy

PROJECT MANAGEMENT & ENGINEERING

Tracking Number			Project Area	Project Risk	Risk Mitigation Plan	Risk Probability	Potential Impact	Mitigation Location / Strategy	Included in Performance Baseline	Status
PME.1										
PME.2					Identify, Analyze, Plan, Monitor and Control					
PME.3					Identify, Analyze, Plan, Monitor and Control					
PME.4					Identify, Analyze, Plan, Monitor and Control					
PME.5					Identify, Analyze, Plan, Monitor and Control					
PME.6										
PME.7					Identify, Analyze, Plan, Monitor and Control					
PME.8					Identify, Analyze, Plan, Monitor and Control					
PME.9					Identify, Analyze, Plan, Monitor and Control					
PME.10					Identify, Analyze, Plan, Monitor and Control					
PME.11					Identify, Analyze, Plan, Monitor and Control					
PME.12					Identify, Analyze, Plan, Monitor and Control					
PME.13					Identify, Analyze, Plan, Monitor and Control					
PME.14										
PME.15					Identify, Analyze, Plan, Monitor and Control					
PME.16					Identify, Analyze, Plan, Monitor and Control					
PME.17					Identify, Analyze, Plan, Monitor and Control					
PME.18					Identify, Analyze, Plan, Monitor and Control					
PME.19					Identify, Analyze, Plan, Monitor and Control					
PME.20										
PME.21					Identify, Analyze, Plan, Monitor and Control					

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TECHNOLOGY

Tracking Number			Project Area	Project Risk	Risk Mitigation Plan	Risk Probability	Potential Impact	Research Location / Strategy	Included in Performance Baseline	Status
TECH.1	Redacted Exemption 4				Identify, Analyze, Plan, Monitor and Control	Redacted Exemption 4				
TECH.2					Identify, Analyze, Plan, Monitor and Control					
TECH.3					Identify, Analyze, Plan, Monitor and Control					
TECH.4					Identify, Analyze, Plan, Monitor and Control					
TECH.5					Identify, Analyze, Plan, Monitor and Control					
TECH.6					Identify, Analyze, Plan, Monitor and Control					
TECH.7					Identify, Analyze, Plan, Monitor and Control					
TECH.8					Identify, Analyze, Plan, Monitor and Control					
TECH.9					Identify, Analyze, Plan, Monitor and Control					
TECH.10					Identify, Analyze, Plan, Monitor and Control					
TECH.11					Identify, Analyze, Plan, Monitor and Control					
TECH.12					Identify, Analyze, Plan, Monitor and Control					
TECH.13					Identify, Analyze, Plan, Monitor and Control					

Operations

Tracking Number			Project Area	Project Risk	Risk Mitigation Plan	Risk Probability	Potential Impact	Research Location / Strategy	Included in Performance Baseline	Status
OP.1	Redacted Exemption 4				Identify, Analyze, Plan, Monitor and Control	Redacted Exemption 4				
OP.2					Identify, Analyze, Plan, Monitor and Control					
OP.3					Identify, Analyze, Plan, Monitor and Control					
OP.4					Identify, Analyze, Plan, Monitor and Control					

FINANCING

Tracking Number			Project Area	Project Risk	Risk Mitigation Plan	Risk Probability	Potential Impact	Included in Performance Baseline	Status
FIN.1	Redacted Exemption 4				Identify, Analyze, Plan, Monitor and Control	Redacted Exemption 4			
FIN.2					Identify, Analyze, Plan, Monitor and Control				
FIN.3					Identify, Analyze, Plan, Monitor and Control				
FIN.4					Identify, Analyze, Plan, Monitor and Control				
FIN.5					Identify, Analyze, Plan, Monitor and Control				
FIN.6					Identify, Analyze, Plan, Monitor and Control				

TIMELINE

Tracking Number			Project Area	Project Risk	Risk Mitigation Plan	Risk Probability	Potential Impact	Included in Performance Baseline	Status
TL.1	Redacted Exemption 4				Identify, Analyze, Plan. Monitor and Control	Redacted Exemption 4			
TL.2									
TL.3					Identify, Analyze, Plan. Monitor and Control				
TL.4					Identify, Analyze, Plan. Monitor and Control				
TL.5					Identify, Analyze, Plan. Monitor and Control				
TL.6					Identify, Analyze, Plan. Monitor and Control				
TL.7					Identify, Analyze, Plan. Monitor and Control				
TL.8					Identify, Analyze, Plan. Monitor and Control				
TL.9					Identify, Analyze, Plan. Monitor and Control				
TL.10					Identify, Analyze, Plan. Monitor and Control				
TL.11					Identify, Analyze, Plan. Monitor and Control				
TL.12					Identify, Analyze, Plan. Monitor and Control				
TL.13					Identify, Analyze, Plan. Monitor and Control				
TL.14					Identify, Analyze, Plan. Monitor and Control				

SCOPE OF WORK

Sapphire Energy, Inc.
Integrated Algal Biorefinery

Project Narrative

IABR Project Phase Descriptions

A. Phase 0 – Origination

Phase 0 focused on concept development and preliminary project planning activities, which have been largely completed at the time of this application.

Concept development activities addressed the most fundamental issue: there was no blueprint for a successful, demonstration-scale algal oil facility because one has never been built. Using information from R&D activities and business modeling exercises, Sapphire determined that commercial algal oil facilities are technically and economically feasible, provided that a demonstration scale algae facility met specific technical and economic milestones. R&D activities identified and solved problems throughout the production value chain, Redacted Exemption 4 These R&D activities were prioritized to ensure that the most difficult barriers to commercialization were addressed first and fully. The Sapphire business model also went through rigorous concept development, including Redacted Exemption 4 . Sapphire chose preliminary IABR site locations based on the results of this model.

With concept development complete, Sapphire planned the IABR project in detail, resulting in the PMP and the WBS included in this application.

B. Phase 1 – Conceptual Analysis

Phase 1 focused on an initial analysis of the fully developed concept; this phase has also been completed. The deliverables included Redacted Exemption 4 . Sapphire conducted these preliminary engineering activities in conjunction with best-in-class partners such as the Harris Group. Additional, highly targeted R&D activities such as Redacted Exemption 4 .

C. Phase 2 – Process Design

Phase 2, includes detailed process engineering, site selection, and site acquisition. Process flow design from Phase 1 has been expanded, tested, and Redacted Exemption 4

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. Based on these data, legal and environmental due diligence, and property negotiations, Sapphire chose among candidate locations and placed the land to be used for the IABR project into escrow. Additional site acquisition activities will be completed prior to Phase 4 construction.

D. Phase 3 – Front End Engineering Design

Using the deliverables from Phase 2, Phase 3 front-end engineering activities, formal permitting activities, and the NEPA process were initiated.

At the beginning of Budget Period 1, engineering activities will commence to develop specifications for the IABR equipment, processes, and materials. Using the experience of its staff and input from industry expert consortium partners Harris Group and AMEC, Sapphire will create a set of standards to ensure compliance with established industry practices, regulations, environmental requirements, and safety. These standards will drive

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, ensuring that the IABR project has passed all the goals of the stage gate and is ready to proceed with construction.

Phase 3 includes the final steps in the permitting process, including stakeholder input leading to local, state, and federal permitting. The design data from Phase 3 will provide the data necessary to complete the permitting applications and assessments. Sapphire will also complete the NEPA process before entering into activities in Budget Period 2, ensuring that the DOE has full NEPA compliance information in 2010.

Sapphire will continue to use AMEC Geomatrix as the primary consultant for its due diligence and permitting activities in Phase 3. Sapphire will be ready to enter procurement in April 2010 and break ground in July 2010.

E. Phase 4 – Implementation

With the specifications and permits completed in Phase 3, final design of the entire IABR process will be completed. This design will

Redacted Exemption 4 with Sapphire's partner, the Harris Group.

With the completion of detailed engineering, Sapphire will meet with the DOE and make the decision to proceed into Budget Period 2. Immediately following the decision, AMEC (Sapphire's construction and procurement management partner) will begin the 3-month procurement process, establishing contracts with vendors and sub-contractors.

The construction period is planned for Redacted Exemption 4

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F. Phase 5 – Checkout and Startup

During the final months of construction, Sapphire will

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G. Phase 6 – Operational Reporting

When construction and startup operations conclude, Phase 6 will commence with regular operational and economic reporting cycles. The reports will present

Redacted Exemption 4 to meet project milestones and to measure the overall outcomes of the IABR against Sapphire and DOE goals.

H. Research and Development Partners

To further improve the techno-economics of the IABR, research and development partners NMSU and SNL will be engaged to study algae ponds. NMSU Pond Liner Research and Sandia National Laboratories Pond Modeling will provide data to improve the IABR pond designs at commercial scale.

I. Project Management and Reporting

Required project reporting activities.

TASKS TO BE PERFORMED (in WBS format)

A	**Phase 0 – Origination**	
A.1	**DOE Budget Periods** Project budget period definitions.	
A.2	**DOE Core WBS Elements** DOE core WBS elements for project tracking.	
A.3	**Feasibility Study** Overall project concept feasibility study.	
A.4	**Phase 0 Stage Gate Evalution**	GN - Go No/Go Decision
A.4.ML.1	**Phase 0 Stage Gate Complete** Project stage gate evaluation.	
B	**Phase 1 - Conceptual Analysis**	
B.1	**Process Development (FEL-1)**	
B.1.ML.1	**FEL-1 Complete** Front End Loaded-1 Engineering work complete internal tracking milestone. Indicates completion of B.1 subtasks.	E - Project Internal Tracking
B.1.1	**Process Development and Cost Estimation** Project scope definition, initial process diagrams, capital cost estimation, equipment list and layout, Class 40 Estimation level.	
B.1.2	**Due Diligence, Initial siting and Permitting** Project siting studies, permitting investigation, long lead permit activity and site due-diligence work. Identification of potential project site(s).	
B.1.3	**Pond Liner Evaluation** Evaluation of pond liner technologies for use on large scale algal ponds.	
B.1.4	**Alagae Separation and Dewatering Studies** Technology study to evaluate current and innovative dewatering technologies for separation of water and algal solids.	

B.1.5	**Modeling and Engineering of CO_2 Transfer** Technology study to evaluation current and innovative dewatering technologies for management of CO_2 injection/transfer to pond systems.	
B.2	**Phase 1 Stage Gate Evaluation**	
B.2.GN.1	**Phase 1 Stage Gate Evaluation** Project stage gate evaluation.	GN - Go No/Go Decision
C	**Phase 2 - Process Design**	
C.1	**Process Definition (FEL-2)**	
C.1.ML.1	**FEL-2 Complete** Front End Loaded-2 Engineering work complete internal tracking milestone. Indicates completion of C.1 subtasks.	E - Project Internal Tracking
C.1.1	**Preliminary Design and Estimation** Engineering, planning and estimation work to refine process diagrams, energy balances, capital and operating expense estimates, equipment list and site general arrangement. Estimation to Class 25 Level.	
C.1.ML.2	**30% Design Complete** Milestone indicating project design has reached 30% design level. Information and design basis supplied to permitting activities to proceed with final permitting activities.	E - Project Internal Tracking
C.1.2	**Pond System Design** Engineering design and evaluation of pond systems. Mechanical fluid system modeling and design, pond layout, water chemistry modeling and control system development. Detailed pond mass balance and water chemistry models.	
C.1.3	**Site Survey** Site topographic and geotechnical survey of identified project site(s).	
C.1.4	**Electrical Utility Engineering Study** Development of long lead electrical utility supply requirements.	
C.2	**Site Planning**	

C.2.ML.1	**Land Purchase Option Executed** Project site real property secured.	E - Project Internal Tracking
C.2.1	**Location Selection** Finalization of project site selection.	
C.2.2	**Location Due Diligence** Completion of required site due-diligence efforts.	
C.2.3	**Regulatory Liabilities Review** Completion of regulatory and permitting requirements review and scope.	
C.3	**Phase 2 Stage Gate Evaluation**	
C.3.GN.1	**Phase 2 Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision
D	**Phase 3 - Front End Engineering Design (FEL-3)**	
D.1	**Front End Engineering Design FEL-3**	
D.1.ML.1	**FEL-3 Complete** Front End Loaded-3 Engineering work complete internal tracking milestone. Indicates completion of C.1 subtasks.	E - Project Internal Tracking
D.2	**Permitting**	
D.2.ML.1	**Receipt of 30% Design** Thirty percent design received from FEL engineering activities allowing permitting to proceed to completion.	E - Project Internal Tracking
D.2.ML.2	**Permitting Complete** All project permits secured.	E - Project Internal Tracking
D.2.1	**NM Office of the State Engineer** Well and water rights permitting.	
D.2.2	**US EPA, Region 6** Construction, Stormwater, Spill Prevention permits and plans.	
D.2.3	**US Army Corps of Engineers** Wetlands determination and permitting.	

D.2.4	**NM Environmental Department** Ground water discharge, Septic, Air Quality and Hazardous Waste permits.	
D.2.5	**US Fish and Wildlife Service** Recovery/Section 7, Migratory Bird and Bald Eagle permits/studies.	
D.2.6	**NM Game and Fish Department** Formal consultations.	
D.2.7	**NM Energy, Minerals and Natural Resources Department** Endangered Plants Act consultation.	
D.2.8	**NM State Historic Preservation Office** Section 106, National Historic Preservation Act	
D.2.9	**US Department of Agriculture** NEPA submission and consultation.	
D.2.10	**Luna County** Building permits.	
D.3	**NEPA**	
D.3.ML.1	**NEPA Finding Issued** NEPA process complete and agency NEPA determination issued.	E - Project Internal Tracking
D.4	**Phase 3 Stage Gate Evaluation**	
D.4.GN.1	**Phase 3 Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision
E	**Phase 4 – Implementation**	
E.1	**Detailed Design for Construction** Final engineering and planning activities to issue project engineering and bid packages for procurement and construction.	
E.1.ML.1	**Completed Facility Design** Bid packages complete.	E - Project Internal Tracking
E.2	**Construction**	

E.2.ML.1	**Procurement and Construction Start** Procurement and construction activities formally authorized.	E - Project Internal Tracking
E.2.1	**Construction Management** Construction and procurement provider contract issued, detailed construction planning starts.	
E.2.2	**Procurement** Project procurement period.	
E.2.3	**Site Preparation** Site construction starts, mobilization, general site preparation, earthwork, utilities and road construction.	
E.2.4	**Infrastructure Construction** Ponds, well, buildings, water channel and security construction.	
E.2.5	**Equipment Installation** Extraction system, dewatering harvest systems, solids handling, feedstock storage and distribution construction.	
E.2.6	**Beneficial Occupancy/Acceptance** Equipment and facility inspection, punch list creation and initial customer hand-off.	
E.2.6.ML.1	**Construction Substantially Complete** Construction substantially complete.	E - Project Internal Tracking
E.2.7	**Completion of Construction** Completion of construction punch lists, final customer acceptance of installation.	
E.2.7.ML.1	**Construction Complete** Construction activities complete milestone.	E - Project Internal Tracking
E.2.7.ML.2	**Contract Close Out** Construction contract obligations fulfilled, bond and lien waver established.	E - Project Internal Tracking
E.3	**Phase 4 Stage Gate Evaluation**	
E.3.GN.1	**Phase 4 Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision

F	**Phase 5 - Checkout and Startup**	
F.1	**Human Resources** Hiring, orientation and basic training of site staff.	
F.1.ML.1	**Staffing Complete** Facility staffing obligations met. Employees ready for specific equipment and on-the-job-training (OJT).	E - Project Internal Tracking
F.2	**Commissioning** Equipment and processes evaluation, documentation and validation to engineering design. Assembly of commissioning documentation.	
F.2.ML.1	**Commissioning Complete** Project commissioning completed.	E - Project Internal Tracking
F.3	**Startup-Up Operations** Facility launch: One year launch curve for facility ramp-up. Employee OJT.	
F.3.ML.1	**Startup-Up Complete** Facility launch curve complete.	E - Project Internal Tracking
F.4	**Volume Operations** Facility operations.	
F.4.ML.1	**Volume Operations Year 1 Complete** Year 1 of operations complete.	E - Project Internal Tracking
F.4.ML.2	**Volume Operations Year 2 Complete** Year 2 of operations complete.	E - Project Internal Tracking
F.5	**Phase 5 Stage Gate Evaluation**	
F.5.GN.1	**Phase 5 Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision
G	**Phase 6 - Post Project Audit and Reliability**	
G.1	**Operational Data Reporting** Collection of facility data for process reporting and analysis.	

G.2	**Financial Data Reporting** Collection of facility data for economic reporting and analysis.	
G.3.GN.1	**Phase 6 Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision
H	**Research and Development Partners**	
H.1	**NMSU - Pond Liner Research** Technology development to advance pond liner design and economics.	
H.2	**SNL - Pond Modeling** Technology development to reduce pond construction and operation costs.	
I	**Project Management and Reporting** Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting Checklist following the instructions included therein.	

Stage Gate Criteria (major decision points)

Key Decision Points – Go/No-go Criteria

The project Quality Assurance Program is based on the Stage Gate process which establishes critical milestones throughout the program. As part of the overall strategy for success, the methodology for assuring quality will establish the key deliverables for each stage and will evaluate them against the overall program goals. At each Stage Gate, the requirements established by the preceding Stage Gate review are evaluated against their specific performance requirements such as cost, efficiency and productivity. The Stage Gate is a critical go/no-go decision point that determines if the project is able to move forward or requires an alternative approach before proceeding. Stage Gate criterion evaluation will be conducted by Senior Sapphire Staff and independent industry professionals. The deliverables framework for each Stage Gate is outlined in the Project Management Plan. The key go/no go criteria are summarized below.

The stage gate process is a structured approach to the decision making and approval process to ensure that the effort expended to make decisions about the viability of a project are minimized and, upon the decision to proceed with the project, controls are in place to ensure a successful project. The IABR stage gate process includes the following phases. These Phases are identified in the WBS and Project Schedule. Elements of these phases have already commenced in some areas.

A. Phase 0 - Origination

The initial phase of the project is an internal generation of an idea. This initial phase (FEL-0) includes the following scope:

- Identification of needs and/or opportunities
- Definition of critical objectives
- Determination whether the project fits vision and competitive strategy
- Prepare screening analysis for review.

A positive review will result in approval to proceed with an investigation of alternatives. A negative review will result in cancellation of the project.

B. Phase 1 – Conceptual Analysis

In this phase, alternatives are identified and a preliminary economic analysis is completed. In this conceptual phase (FEL-1), the following items are considered:

- Definition of root opportunity, problems, and objectives for value creation
- Brainstorm opportunities and use critical thinking skills and risk-taking mentality to develop a range of creative alternatives.
- Identify keys risks and opportunities
- Scope and screen alternatives

The following activities are included in the analysis:

- Short list alternatives with scope, risk, feasibility, and assumptions
- Preliminary scope, PFD, major equipment list, general arrangements

- Preliminary estimate for each selected option
- Preliminary Project Execution Plan for Phase 2
- Preliminary analysis with any funding requirements for next phase development

A positive review of this phase results in approval to proceed with the Phase 2 technical development of feasible alternatives.

C. Phase 2 – Process Design

In this phase (FEL-2), the alternatives are analyzed and one of the alternatives with a preliminary scope is selected for further development. The following items are considered:

- Definition of preliminary scope, critical issues, and key drivers for alternatives
- Definition and investigation of major risks and assumptions
- In-depth review of all viable alternatives
- Economic and risk analysis
- Set basis of design expectations for quality, operability, and reliability)

The following activities are included in the analysis:

- Preliminary scope definition and economic/risk analysis for each alternative
- Project charter for detail design and construction
- Updated PFDs, plot plan, GAs, equipment list, utility summary, and one-lines for alternatives
- List of key risks, assumptions, and drivers with responsibilities assigned for alternatives
- Define quality and reliability expectations
- Updated Preliminary Project Execution Plan & Schedule
- Updated Risk Assessment
- FEL2 Scope and estimate (+/- 30%) of selected options
- Recommended Phase 3 alternative
- Analysis for review with any funding requirements for Phase 3 development

A positive review of this phase results in approval to proceed with the Phase 3 preliminary engineering and full scope development of the selected alternative.

D. Phase 3 – Front End Engineering Design

In this phase (FEL-3), the preliminary engineering is completed to produce a fully defined scope and a detailed capital cost estimate for approval of project funding. The following items are considered:

- Complete project scope definition and review with key stakeholders
- Finalize cost estimate, business case, financial & risk analysis.
- Submit funding request for approval
- Complete safety design review

- Revisit project economics and risk analysis
- Prepare detailed marketing assessment and manufacturing plan
- Define Execution Plan
- Submit environmental permits

The following activities are included in the analysis:

- Final PFD and Heat and Material Balance
- Fully defined, signed-off, frozen project scope & preliminary schedule
- Final funding version of all critical scope documents, including P&IDs, plot plan, GAs, utility flow diagrams / summaries, and electrical classification drawings
- Major equipment fully specified and ready for purchase
- Complete Project Execution Plan including Project Controls, Procurement Strategy, and Cost Tracking
- Permits
- FEL3 Detailed scope and cost estimate (+/- 10%) with work breakdown schedule
- Investment proposal with risk-adjusted economics, assumptions & key drivers

A positive review at this point results in approval to implement the project.

E. Phase 4 - Implementation

This phase of the project includes the engineering and construction of the facility. The following items are considered:

- Purchase equipment and spare parts
- Establish Project Controls
- Develop Detail Construction Plans
- Negotiate major construction contracts
- Develop operating procedures and training plans
- Commission Plan
- Complete engineering – “Issue for Construction Drawings”
- Install equipment safely with the optimal balance of cost, schedule, and quality
- Complete training Program
- Perform pre check-out & startup activities

The following activities are included:

- All major or long lead-time equipment ordered
- Acquire necessary construction /environmental permits
- Detailed project schedules
- Risk assessment
- “Issued for Construction” work packages
- Construction contracts
- Project audit preparation file
- Construction measurements and schedule tracking Reports

- Operators and Maintenance Training
- Commissioning Plan
- Spare parts on site
- O&M Manuals
- Mechanically complete

F. Phase 5 – Check Out and Startup

Following mechanical completion of the project, the equipment and processes are checked out to confirm readiness to startup, then the start up of the facility proceeds. The following items are considered:

- Perform final inspections and systems checkout
- Pre-startup safety review
- Compile and complete pre-startup Punchlist
- Perform operability tests
- Compile data for post-audit preparation

G. Phase 6 – Post Project Audit and Reliability

The final phase of the project completes the project documentation and provides an assessment that documents that the project has met the project goals. The following items are considered.

- Schedule & perform Performance Guarantee test of all pertinent unit operations
- Resolve any contract issues
- Compare final outcomes to project objectives
- Update pertinent drawings to Record status
- Close out project

Major Partners

Sapphire Energy, Inc. is solely responsible for the IABR project. No partnerships are associated with the IABR Project.

ASSISTANCE AGREEMENT

1. Award No.	2. Modification No.	3. Effective Date	4. CFDA No.
DE-EE0002884	003	12/29/2009	81.087

5. Awarded To	6. Sponsoring Office	7. Period of Performance
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401	12/29/2009 through 03/31/2011

8. Type of Agreement	9. Authority	10. Purchase Request or Funding Document No.
☐ Grant ☒ Cooperative Agreement ☐ Other	109-58, Energy Policy Act 2005 111-5, Recovery Act 2009	10EE008185

11. Remittance Address	12. Total Amount	13. Funds Obligated
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Govt. Share: $49,725,000.00 Cost Share : $ Redacted Exemption 4 Total : $ Redacted Exemption 4	This action: $0.00 Total : $49,725,000.00

14. Principal Investigator	15. Program Manager	16. Administrator
Jamie E. Moreno Phone: 949-202-4700	Carol Christine Sterner Phone: 303-275-4720	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401-3393

17. Submit Payment Requests To	18. Paying Office	19. Submit Reports To
OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831	OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831	

20. Accounting and Appropriation Data

IBR

21. Research Title and/or Description of Project

RECOVERY ACT - SAPPHIRE INTEGRATED ALGAL BIOFINERY (IABR)

For the Recipient		For the United States of America	
22. Signature of Person Authorized to Sign		25. Signature of Grants/Agreements Officer Signature on File	
23. Name and Title	24. Date Signed	26. Name of Officer Molly Hames	27. Date Signed 09/15/2010

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	DUNS Number: 798830688 The purpose of this modification is to extend the Period of Performance, as noted in Block 7 of the Assistance Agreement. All other terms and conditions remain unchanged. In Block 7 of the Assistance Agreement, the Period of Performance reflects the beginning of the Project Period through the end of the current Budget Period, shown as 12/29/2009 through 03/31/2011. For multiple Budget Periods, see Special Terms and Conditions, Provision 4, "Award Project Period and Budget Periods." The total amounts reflected in Blocks 12 and 13 of the Assistance Agreement do not include the Federally Funded Research and Development Center (FFRDC) funding amount of $275,000, which will be funded directly. DOE Award Administrator: Molly Hames E-mail: molly.hames@go.doe.gov Phone: 303-275-4864 DOE Project Officer: Christy Sterner E-mail: christy.sterner@go.doe.gov Phone: 303-275-4720 Recipient Business Officer: Jamie E. Moreno E-mail: jaime.moreno@sapphireenergy.com Phone: 949-202-4700 Recipient Principal Investigator: Jamie E. Moreno E-mail: jaime.moreno@sapphireenergy.com Phone: 949-202-4700 "Electronic signature or signatures as used in this document means a method of signing an electronic message that-- (A) Identifies and authenticates a particular person as the source of the electronic message; (B) Indicates such person's approval of the information contained in the electronic message; and, (C) Submission via FedConnect constitutes electronically signed documents." Continued ...				

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	DE-EE0002884/003	3	3

NAME OF OFFEROR OR CONTRACTOR

SAPPHIRE ENERGY, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	ASAP: NO Extent Competed: COMPETED Davis-Bacon Act: YES Fund: 05794 Appr Year: 2009 Allottee: 31 Report Entity: 200835 Object Class: 41000 Program: 1004173 Project: 2004000 WFO: 0000000 Local Use: 0000000 TAS Agency: 89 TAS Account: 0331				

Hames, Molly

From: Sterner, Christy
Sent: Monday, September 13, 2010 3:40 PM
To: English, Christine; Hames, Molly
Subject: FW: Request for Time Extension - EE0002884
Attachments: image001.png

Hi Christine and Molly,

I concur with Sapphire's request below. We verbally discussed a six month no cost extension. I recommend approval of the request. If additional information is needed, please let me know. If you need additional confirmation of the six month time-frame, please contact Mr. Moreno as I'm sure he'd be happy to confirm it.

Best regards,

Christy Sterner
U.S. DOE

Go to http://www.eere.energy.gov/golden/funding.aspx for important news regarding Grants.gov.

-----Original Message-----
From: Jaime Moreno [mailto:jaime.moreno@sapphireenergy.com]
Sent: Wednesday, September 08, 2010 10:47 AM
To: Sterner, Christy
Cc: English, Christine; Dave Marsh; Jason Pyle
Subject: Request for Time Extension - EE0002884

Dear Ms. Sterner,

As you are aware, Sapphire Energy and the DOE have made significant progress in the development of Sapphire's Integrated Algal Biorefinery (IABR) project in Columbus, New Mexico.

At present, Sapphire and the DOE are working with the USDA to establish a final funding plan for the entire project through its entire operational cycle. Based upon recent discussions, it is our understanding that the process will not be completed in time to allow Sapphire to present a comprehensive Budget Period 2 funding request in accord with DOE's current guidelines.

As a result, Sapphire respectfully requests a No Cost Time Extension for our current Budget Period 1 activities.

With this extension, we will be able to conclude our project funding plan with the DOE and USDA and proceed forward in an efficient and comprehensive manner with both partner agencies. Please be certain that we will continue to aggressively pursue the project's goals and schedules during this period and will endeavor to proactively manage any potential impacts such that their overall effect to the project is minimized.

Should you have any questions or require any additional information, please do not hesitate in contacting me directly.

As always, your continued time and attention is sincerely appreciated.

Very truly yours,

Jaime E. Moreno

Jaime E. Moreno, P.E.

Vice President

Sapphire Energy, Inc.

27101 Puerta Real, Suite 280

Mission Viejo, CA 92691

949-202-4700 Office

949-367-0650 Fax

jaime.moreno@sapphireenergy.com <mailto:jaime.moreno@sapphireenergy.com>

Hames, Molly

From: Jaime Moreno [jaime.moreno@sapphireenergy.com]
Sent: Wednesday, September 08, 2010 10:47 AM
To: Sterner, Christy
Cc: English, Christine; Dave Marsh; Jason Pyle
Subject: Request for Time Extension - EE0002884
Attachments: image001.png

Dear Ms. Sterner,

As you are aware, Sapphire Energy and the DOE have made significant progress in the development of Sapphire's Integrated Algal Biorefinery (IABR) project in Columbus, New Mexico.

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As always, your continued time and attention is sincerely appreciated.

Very truly yours,

Jaime E. Moreno

Jaime E. Moreno, P.E.

Vice President

Sapphire Energy, Inc.

27101 Puerta Real, Suite 280

Mission Viejo, CA 92691

949-202-4700 Office

949-367-0650 Fax

jaime.moreno@sapphireenergy.com <mailto:jaime.moreno@sapphireenergy.com>

ASSISTANCE AGREEMENT

1. Award No.	2. Modification No.	3. Effective Date	4. CFDA No.
DE-EE0002884	004	12/29/2009	81.087

5. Awarded To	6. Sponsoring Office	7. Period of Performance
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401	12/29/2009 through 09/30/2011

8. Type of Agreement	9. Authority	10. Purchase Request or Funding Document No.
☐ Grant ☒ Cooperative Agreement ☐ Other	109-58, Energy Policy Act 2005 111-5, Recovery Act 2009	11EE003362

11. Remittance Address	12. Total Amount	13. Funds Obligated
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Govt. Share: $49,725,000.00 Cost Share : $Redacted Exemption 4 Total : $Redacted Exemption 4	This action: $0.00 Total : $49,725,000.00

14. Principal Investigator	15. Program Manager	16. Administrator
Jamie E. Moreno Phone: 949-202-4700	Carol Christine Sterner Phone: 303-275-4720	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401-3393

17. Submit Payment Requests To	18. Paying Office	19. Submit Reports To
OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831	OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831	

20. Accounting and Appropriation Data

IBR

21. Research Title and/or Description of Project

RECOVERY ACT - SAPPHIRE INTEGRATED ALGAL BIOFINERY (IABR)

For the Recipient		For the United States of America	
22. Signature of Person Authorized to Sign		25. Signature of Grants/Agreements Officer Signature on File	
23. Name and Title	24. Date Signed	26. Name of Officer Molly Hames	27. Date Signed 04/26/2011

NAME OF OFFEROR OR CONTRACTOR
SAPPHIRE ENERGY, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	DUNS Number: 798830688 The purpose of this modification is to extend the Period of Performance, as noted in Block 7 of the Assistance Agreement. All other terms and conditions remain unchanged. In Block 7 of the Assistance Agreement, the Period of Performance reflects the beginning of the Project Period through the end of the current Budget Period, shown as 12/29/2009 through 09/30/2011. For multiple Budget Periods, see Special Terms and Conditions, Provision 4, "Award Project Period and Budget Periods." The total amounts reflected in Blocks 12 and 13 of the Assistance Agreement do not include the Federally Funded Research and Development Center (FFRDC) funding amount of $275,000, which will be funded directly. DOE Award Administrator: Molly Hames E-mail: molly.hames@go.doe.gov Phone: 303-275-4864 DOE Project Officer: Christy Sterner E-mail: christy.sterner@go.doe.gov Phone: 303-275-4720 Recipient Business Officer: Jamie E. Moreno E-mail: jaime.moreno@sapphireenergy.com Phone: 949-202-4700 Recipient Principal Investigator: Jamie E. Moreno E-mail: jaime.moreno@sapphireenergy.com Phone: 949-202-4700 "Electronic signature or signatures as used in this document means a method of signing an electronic message that-- (A) Identifies and authenticates a particular person as the source of the electronic message; (B) Indicates such person's approval of the information contained in the electronic message; and, (C) Submission via FedConnect constitutes electronically signed documents." ASAP: NO Extent Competed: COMPETED Davis-Bacon Act: YES Continued ... Fund: 05794 Appr Year: 2009 Allottee: 31 Report				

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	DE-EE0002884/004	3	3

NAME OF OFFEROR OR CONTRACTOR

SAPPHIRE ENERGY, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Entity: 200835 Object Class: 41000 Program: 1004173 Project: 2004000 WFO: 0000000 Local Use: 0000000				

Kim, William

From: Sterner, Christy
Sent: Monday, March 28, 2011 11:57 AM
To: English, Christine
Subject: FW: Request for Time Extension BP1 EE0002884

Hi Christine,

I concur with this request. Do you have time to process the requisition? If not, please let me know.

Thanks for your help.

Best regards,

Christy Sterner
U.S. DOE

Go to http://www.eere.energy.gov/golden/funding.aspx for important news regarding Grants.gov.

-----Original Message-----
From: Jaime Moreno [mailto:jaime.moreno@sapphireenergy.com]
Sent: Monday, March 14, 2011 10:33 AM
To: Sterner, Christy
Cc: English, Christine; Dave Marsh
Subject: Request for Time Extension BP1 EE0002884

Dear Ms. Sterner,

As a follow-up to earlier discussions, Sapphire Energy respectfully requests a time extension for Budget Period 1 of our Integrated Algal Biorefinery Project, EE0002884.

It is our understanding that as a matter of DOE practice the time extension will be for a period of six months and as such the new expiration date for Budget Period 1 would be September 30, 2011. Please be certain that it is Sapphire's intention to advance the project into Budget Period 2 well in advance of September 2011.

Should you have any questions or require any additional information, please do not hesitate in contacting me directly.

As always, DOE's continued support and assistance is greatly appreciated.

Best regards,

Jaime

Jaime E. Moreno, P.E.

Vice President

Sapphire Energy, Inc.

_____

ASSISTANCE AGREEMENT

1. Award No.	2. Modification No.	3. Effective Date	4. CFDA No.
DE-EE0002884	005	12/29/2009	81.087

5. Awarded To	6. Sponsoring Office	7. Period of Performance
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401	12/29/2009 through 12/31/2011

8. Type of Agreement	9. Authority	10. Purchase Request or Funding Document No.
☐ Grant ☒ Cooperative Agreement ☐ Other	109-58, Energy Policy Act 2005 111-5, Recovery Act 2009	11EE005226

11. Remittance Address	12. Total Amount	13. Funds Obligated
SAPPHIRE ENERGY, INC. Attn: DAVID BUTTARO SAPPHIRE ENERGY 3115 MERRYFIELD ROW SAN DIEGO CA 921211125	Govt. Share: $49,725,000.00 Cost Share : $Redacted Exemption 4 Total : $ Redacted Exemption 4	This action: $0.00 Total : $49,725,000.00

14. Principal Investigator	15. Program Manager	16. Administrator
Jamie E. Moreno Phone: 949-202-4700	Carol Christine Sterner Phone: 303-275-4720	Golden Field Office U.S. Department of Energy Golden Field Office 1617 Cole Blvd. Golden CO 80401-3393

17. Submit Payment Requests To	18. Paying Office	19. Submit Reports To
OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831	OR for Golden U.S. Department of Energy Oak Ridge Financial Service Center P.O. Box 4517 Oak Ridge TN 37831	See Attachment 3

20. Accounting and Appropriation Data

See Schedule

21. Research Title and/or Description of Project

RECOVERY ACT - SAPPHIRE INTEGRATED ALGAL BIOREFINERY (IABR)

For the Recipient		For the United States of America	
22. Signature of Person Authorized to Sign		25. Signature of Grants/Agreements Officer Signature on File	
23. Name and Title	24. Date Signed	26. Name of Officer Melissa Y. Wise	27. Date Signed 08/26/2011

NAME OF OFFEROR OR CONTRACTOR
SAPPHIRE ENERGY, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	DUNS Number: 798830688 The purpose of this modification is to move tasks from Budget Period 2 into Budget Period 1. Accordingly the following changes are made: 1) Grant a No Cost Time Extension, specifically to extend the end of Budget Period 1 from 09/30/2011 to 12/31/2011, as shown in Block 7. 2) Delete and replace the Special Terms and Conditions to incorporate the following changes: a. Delete and replace the "Award Project Period and Budget Periods" provision; b. Delete and replace the "Cost Sharing" provision; c. Delete and replace the "Funding of Budget Periods" provision; d. Delete and replace the "National Environmental Policy Act (NEPA) Requirements" provision; e. Add the "Central Contractor Registration and Universal Identifier Requirements" provision; and f. Delete the "Reopener Term - Pending Indirect Rates - Financial Assistance" provision; 3) Delete and replace the Statement of Project Objectives (Attachment 2); 4) Delete and replace the Reporting Requirements Checklist and Instructions (Attachment 3), DOE F 4600.2, revising the following sections: A. Management Reporting, D. Closeout Reporting, E. Other Reporting, and Instructions attached to the Reporting Checklist. 5) Delete and replace the Budget Information, SF-424A (Attachment 4); and All other terms and conditions remain unchanged. In Block 7 of the Assistance Agreement, the Period of Performance reflects the beginning of the Project Period through the end of the current Budget Period, shown as 12/29/2009 through 12/31/2011. For multiple Budget Periods, see Special Terms and Conditions, Provision 4, "Award Project Period and Budget Periods." The total amounts reflected in Blocks 12 and 13 of the Assistance Agreement do not include the Federally Funded Research and Development Center Continued ... (FFRDC) funding amount of $275,000, which will be				

NAME OF OFFEROR OR CONTRACTOR
SAPPHIRE ENERGY, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	funded directly. DOE Award Administrator: Molly Hames E-mail: molly.hames@go.doe.gov Phone: 303-275-4864 DOE Project Officer: Christy Sterner E-mail: christy.sterner@go.doe.gov Phone: 303-275-4720 Recipient Business Officer: Jamie E. Moreno E-mail: jaime.moreno@sapphireenergy.com Phone: 949-202-4700 Recipient Principal Investigator: Jamie E. Moreno E-mail: jaime.moreno@sapphireenergy.com Phone: 949-202-4700 "Electronic signature or signatures as used in this document means a method of signing an electronic message that-- (A) Identifies and authenticates a particular person as the source of the electronic message; (B) Indicates such person's approval of the information contained in the electronic message; and, (C) Submission via FedConnect constitutes electronically signed documents." ASAP: NO Extent Competed: COMPETED Davis-Bacon Act: YES				

STATEMENT OF PROJECT OBJECTIVES

Sapphire Energy, Inc.
Integrated Algal Biorefinery

A. PROJECT OBJECTIVES

The Sapphire IABR project will realize the following objectives:

1. The design and construction of: all required infrastructure, including equipment, design and control methods, for the production of algal oil for green jet fuel and green diesel.

2. The shakedown and testing of: material and energy flows for all processes inputs and product flows and comparison of different process operating conditions, product flow rates and yields from different commercial algal strains against model projections.

3. The establishment of: steady state operations including material and energy balances; plant process design, including operating conditions, cash flow and capital requirements for a full-scale commercial plant capable of producing greater than 150 million gallons of algae oil per year (10,000 bpd).

B. PROJECT SCOPE

The Integrated Algal Biorefinery (IABR) will be built in Luna Country, near Columbus, New Mexico. The algae will fix approximately 56 metric tons of CO_2 per day and produce, on average, 100 barrels of green crude oil per day, or approximately 1 million gallons per year, of finished fuel product. The successful project will demonstrate the technical and economic feasibility of the algae to green fuels process that will form the basis for a series of commercial scale biorefineries.

C. TASKS TO BE PERFORMED

A	**Process Design**	
A.1	**Award 1 Preparation**	
A.1.ML.1	**Risk mitigation plan validation completed - Award 1 (DOE Core)**	E - Project Internal Tracking
A.1.ML.2	**Submission of Award 1 application (DOE Core)**	E - Project Internal Tracking
A.1.ML.3	**Acceptance of Award 1 application (DOE Core)**	E - Project Internal Tracking
A.1.ML.4	**CD-2 Approve Performance Baseline (DOE Core)**	E - Project Internal Tracking

A.1.ML.5	**Release of Award 1 funds (DOE Core)**	E - Project Internal Tracking
A.1.ML.6	**BP-1 Start**	E - Project Internal Tracking
A.2	**Process Definition (FEL-2)** Engineering, planning and estimation work to refine process diagrams, energy balances, capital and operating expense estimates, equipment list and site general arrangement. Estimation to Class 25 Level.	
A.2.ML.1	**FEL-2 Complete** Front End Loaded-2 Engineering work complete internal tracking milestone.	E - Project Internal Tracking
A.2.ML.2	**30% Design Complete** Milestone indicating project design has reached 30% design level. Information and design basis supplied to permitting activities to proceed with final permitting activities.	E - Project Internal Tracking
A.3	**Site Planning** Site selection, screening and evaluation of potential locations. Completion of required site due-diligence efforts. Completion of regulatory and permitting requirements review and scope.	
A.3.ML.1	**Land Purchase Option Executed** Project site real property secured.	E - Project Internal Tracking
A.4	**Task A Stage Gate Evaluation**	
A.4.GN.1	**Task A Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision
B	**Front End Engineering**	
B.1	**Front End Engineering Design (FEL-3)**	
B.1.ML.1	**FEL-3 Complete** Front End Loaded-3 Engineering work complete internal tracking milestone.	E - Project Internal Tracking
B.2	**Permitting**	
B.2.ML.1	**Permitting Complete** Permits required to start construction secured.	E - Project Internal Tracking
B.3	**National Environmental Policy Act (NEPA)**	
B.3.ML.1	**NEPA Finding Issued** NEPA process complete and agency NEPA determination issued.	E - Project Internal Tracking

B.4	**Detailed Engineering** Final engineering and planning activities to issue project engineering and bid packages for procurement and construction.	
B.4.ML.1	**Completed Facility Design** Issued for Bid Package delivered to Construction Management.	E - Project Internal Tracking
B.5	**Staging** Project site mobilization, pre-construction services (detail survey, earthwork modeling, site construction trailer infrastructure, security, health and safety program), site power connection(s), relocation of utility interferences, well development and pre-grading soil preparation work. Early procurement of critical path long-lead equipment.	E - Project Internal Tracking
B.6	**Task B Stage Gate Evaluation**	
B.6.GN.1	**Task B Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision
C	**Implementation**	
C.1	**Award 2 Preparation**	
C.1.ML.1	**Risk mitigation plan validation completed - Award 2 (DOE Core)**	E - Project Internal Tracking
C.1.ML.2	**NEPA approval to proceed (DOE Core)**	E - Project Internal Tracking
C.1.ML.3	**Engineering, Procurement, and Construction (EPC) contract finalized and signed (DOE Core)**	E - Project Internal Tracking
C.1.ML.4	**Financial Closing (DOE Core)**	E - Project Internal Tracking
C.1.ML.5	**Define commissioning criteria (DOE Core)**	E - Project Internal Tracking
C.1.ML.6	**Submission of Award 2 application (DOE Core)**	E - Project Internal Tracking
C.1.ML.7	**Acceptance of Award 2 application (DOE Core)**	E - Project Internal Tracking
C.1.ML.8	**CD-3 Approve Start of Construction (DOE Core)**	E - Project Internal Tracking

C.1.ML.9	**Release of Award 2 funds (DOE Core)**	E - Project Internal Tracking
C.1.ML.10	**BP-2 Start**	E - Project Internal Tracking
C.2	**Construction 1 - Technology Deployment 1** Construction and commissioning of Deployment 1	-
C.3	**Engineering 2 - Technology Deployment 2** Planning and Engineering of Deployment 2	-
C.4	**Construction 2 - Technology Deployment 2** Construction and commissioning of Deployment 2	-
C.5	**Engineering 3 - Technology Deployment 3** Planning and Engineering of Deployment 3	-
C.6	**Construction 3 - Technology Deployment 3** Construction and commissioning of Deployment 3	-
D	**Process Demonstration and Evaluation**	-
D.1	**Award 3 Preparation**	-
D.1.ML.1	**CD-4: Start of Operation Approval - Initiate Shakedown (DOE Core)**	E - Project Internal Tracking
D.1.ML.2	**Shakedown complete (DOE Core)**	E - Project Internal Tracking
D.1.ML.3	**Commissioning - Start of commercial operation (DOE Core)**	E - Project Internal Tracking
D.1.ML.4	**Completion of Commissioning Criteria (DOE Core)**	E - Project Internal Tracking
D.1.ML.5	**BP-3 Start**	E - Project Internal Tracking
D.2	**Process Demonstration 1 - Deployment 1**	-
D.2.GN.1	**Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision
D.3	**Process Demonstration 2 - Deployment 2**	-
D.3.GN.1	**Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision

D.4	**Process Demonstration 3 - Deployment 3**	
D.4.GN.1	**Stage Gate Evaluation** Project Stage Gate evaluation.	GN - Go No/Go Decision
D.5	**Operational Data Reporting** Collection of facility data for process reporting and analysis.	
D.6	**Financial Data Reporting** Collection of facility data for economic reporting and analysis.	
D.7	**Task D Stage Gate Evaluation**	
D.7.GN.1	**Task D Stage Gate Evaluation** Project Close-Out Stage Gate evaluation.	GN - Go No/Go Decision
D.7.ML.4	**BP-3 End**	E - Project Internal Tracking

DOE F 4600.2
(3/11)
All Other Editions Are Obsolete

Attachment 3

U.S. Department of Energy
FEDERAL ASSISTANCE REPORTING CHECKLIST AND INSTRUCTIONS FOR RD&D PROJECTS

1. Identification Number:	2. Program/Project Title:
DE -EE0002884.005	Recovery Act - Sapphire Integrated Algal Biorefinery (IABR)

3. Recipient:

Sapphire Energy, Inc.

4. ReportingRequirements:		Frequency	Addresses
A. MANAGEMENT REPORTING			
☑ Research Performance Progress Report (RPPR)		A	https://www.eere-pmc.energy.gov/SubmitReports.aspx
☑ Special Status Report		A	https://www.eere-pmc.energy.gov/SubmitReports.aspx
B. SCIENTIFIC/TECHNICAL REPORTING (Reports/Products must be submitted with appropriate DOE F 241. The 241 forms are available at www.osti.gov/elink)			
Report/Product	Form		
☑ Final Scientific Report	DOE F 241.3	F	http://www.osti.gov/elink-2413
☑ Conference papers/proceedings*	DOE F 241.3	A	http://www.osti.gov/elink-2413
☑ Software/Manual	DOE F 241.4	A	http://www.osti.gov/estsc/241-4pre.jsp
☐ Other (see special instructions)	DOE F 241.3		http://www.osti.gov/elink-2413
** Scientific and technical conferences only*			
C. FINANCIAL REPORTING			
☑ SF-425, Federal Financial Report		FQ	https://www.eere-pmc.energy.gov/SubmitReports.aspx
D. CLOSEOUT REPORTING			
☑ Patent Certification		F	https://www.eere-pmc.energy.gov/SubmitReports.aspx
☑ SF-428 & 428B Final Property Report		F	https://www.eere-pmc.energy.gov/SubmitReports.aspx
☐ Other			https://www.eere-pmc.energy.gov/SubmitReports.aspx
E. OTHER REPORTING			
☑ Annual Indirect Cost Proposal		Y180	See block 5 below for instructions.
☑ Audit of For-Profit Recipients		Y180	See block 5 below for addresses.
☐ SF-428 Tangible Personal Property Report Forms Family			https://www.eere-pmc.energy.gov/SubmitReports.aspx
☑ Other		AF	https://www.eere-pmc.energy.gov/SubmitReports.aspx

FREQUENCY CODES AND DUE DATES:

A - Within 5 calendar days after events or as specified.

F - Final; 90 calendar days after expiration or termination of the award.

Y - Yearly; 90 days after the end of the reporting period.

S - Semiannually; within 30 days after end of the reporting period.

Q - Quarterly; within 30 days after end of the reporting period.

O - Other: See instructions for further details

Y180 - Yearly; 180 days after end of the recipient's fiscal year.

5. Special Instructions:

Annual Indirect Cost Proposal - If DOE is the Cognizant Federal Agency, then the proposal should be sent to https://www.eere-pmc.energy.gov/SubmitReports.aspx. Otherwise, it should be sent to the Cognizant Federal Agency.

Audit of For-Profit Recipients must be sent to 2 different addresses in accordance with the final audit guidance. A copy for the Contracting Officer shall be submitted via https://www.eere-pmc.energy.gov/SubmitReports.aspx; a copy must also be e-mailed to the CFO at DOE-Audit-Submissions@hq.doe.gov

MANAGEMENT REPORTING

Special Instructions for the Progress Report: 1) The monthly progress report and financial spreadsheet templates will be forwarded to the Recipient after award. These reports are due within 30 days following the end of each month the project is active.

OTHER REPORTING

Special Instructions: 1) A Project Management Plan (PMP) is due to the Project Officer 30 days after award and should be revised on a yearly basis. An electronic template will be provided to the Recipient to complete or update as needed. 2) An Annual Technical and Financial Report must be developed and submitted to the DOE Project Officer after award and must be updated annually throughout the duration of the award. Subject to the availability of project funding, the Report will also be due annually for three (3) years after the facility is substantially completed. The schedule for submission will be established by the DOE Project Officer after award. The format of the report with instructions for completion, the electronic template for reporting data, and the schedule will be forwarded to the Recipient after award. 3) Comprehensive Annual Project Review - The Recipient will be required to present the Annual Technical and Financial Report at a Comprehensive Annual Project Review Meeting. The schedule for the Comprehensive Annual Project Review will be established by the DOE Project Officer after the award. AMERICAN RECOVERY AND REINVESTMENT ACT REPORTING: See the Special Terms and Conditions for Recovery Act reporting requirements, along with the following website: http:/www.federalreporting.gov. The required reports are due no later than ten calendar days after each calendar quarter in which the recipient receives the assistance award funded in whole or in part by the Recovery Act. Recipients are to report according to ARRA reporting instructions.

Federal Assistance Reporting Instructions (3/11)

A. MANAGEMENT REPORTING

Research Performance Progress Report (RPPR)

See attached document entitled "Research Performance Progress Report".

Special Status Report

The recipient must report the following events by e-mail as soon as possible after they occur:

1. Developments that have a significant favorable impact on the project.

2. Problems, delays, or adverse conditions which materially impair the recipient's ability to meet the objectives of the award or which may require DOE to respond to questions relating to such events from the public. The recipient must report any of the following incidents and include the anticipated impact and remedial action to be taken to correct or resolve the problem/condition:

    a. Any single fatality or injuries requiring hospitalization of five or more individuals.

    b. Any significant environmental permit violation.

    c. Any verbal or written Notice of Violation of any Environmental, Safety, and Health statutes.

    d. Any incident which causes a significant process or hazard control system failure.

    e. Any event which is anticipated to cause a significant schedule slippage or cost increase.

    f. Any damage to Government-owned equipment in excess of $50,000.

    g. Any other incident that has the potential for high visibility in the media.

B. SCIENTIFIC/TECHNICAL REPORTS

Final Scientific/Technical Report

Content. The final scientific/technical report must include the following information and any other information identified under Special Instructions on the Federal Assistance Reporting Checklist:

1. Identify the DOE award number; name of recipient; project title; name of project director/principal investigator; and consortium/teaming members.

2. Display prominently on the cover of the report any authorized distribution limitation notices, such as patentable material or protected data. Reports delivered without such notices may be deemed to have been furnished with unlimited rights, and the Government assumes no liability for the disclosure, use or reproduction of such reports.

3. Provide an executive summary, which includes a discussion of: (1) how the research adds to the understanding of the area investigated; (2) the technical effectiveness and economic feasibility of the methods or techniques investigated or demonstrated; or (3) how the project is otherwise of benefit to the public. The discussion should be a minimum of one paragraph and written in terms understandable by an educated layman.

4. Provide a comparison of the actual accomplishments with the goals and objectives of the project.

5. Summarize project activities for the entire period of funding, including original hypotheses, approaches used, problems encountered and departure from planned methodology, and an assessment of their impact on the project results. Include, if applicable, facts, figures, analyses, and assumptions used during the life of the project to support the conclusions.

6. Identify products developed under the award and technology transfer activities, such as:

    a. Publications (list journal name, volume, issue), conference papers, or other public releases of results. If not provided previously, attach or send copies of any public releases to the DOE Program Manager identified in Block 15 of the Assistance Agreement Cover page;

    b. Web site or other Internet sites that reflect the results of this project;

    c. Networks or collaborations fostered;

    d. Technologies/Techniques;

    e. Inventions/Patent Applications, licensing agreements; and

    f. Other products, such as data or databases, physical collections, audio or video, software or netware, models, educational aid or curricula, instruments or equipment.

7. For projects involving computer modeling, provide the following information with the final report:

    a. Model description, key assumptions, version, source and intended use;

    b. Performance criteria for the model related to the intended use;

    c. Test results to demonstrate the model performance criteria were met (e.g., code verification/validation, sensitivity analyses, history matching with lab or field data, as appropriate);

    d. Theory behind the model, expressed in non-mathematical terms;

    e. Mathematics to be used, including formulas and calculation methods;

f. Whether or not the theory and mathematical algorithms were peer reviewed, and, if so, include a summary of theoretical strengths and weaknesses;

g. Hardware requirements; and

h. Documentation (e.g., users guide, model code).

Electronic Submission. The final scientific/technical report must be submitted electronically via the DOE Energy Link System (E-Link) accessed at http://www.osti.gov/elink-2413.

Electronic Format. Reports must be submitted in the ADOBE PORTABLE DOCUMENT FORMAT (PDF) and be one integrated PDF file that contains all text, tables, diagrams, photographs, schematic, graphs, and charts. Materials, such as prints, videos, and books, that are essential to the report but cannot be submitted electronically, should be sent to the DOE Administrator at the address listed in Block 16 of the Assistance Agreement Cover Page.

Submittal Form. The report must be accompanied by a completed electronic version of DOE Form 241.3, "U.S. Department of Energy (DOE), Announcement of Scientific and Technical Information (STI)." You can complete, upload, and submit the DOE F 241.3 online via E-Link. You are encouraged not to submit patentable material or protected data in these reports, but if there is such material or data in the report, you must: (1) clearly identify patentable or protected data on each page of the report; (2) identify such material on the cover of the report; and (3) mark the appropriate block in Section K of the DOE F 241 3. Reports must not contain any limited rights data (proprietary data), classified information, information subject to export control classification, or other information not subject to release. Protected data is specific technical data, first produced in the performance of the award that is protected from public release for a period of time by the terms of the award agreement.

Conference Papers/Proceedings

Content. The recipient must submit a copy of any conference papers/proceedings, with the following information: (1) Name of conference; (2) Location of conference; (3) Date of conference; and (4) Conference sponsor.

Electronic Submission. Scientific/technical conference paper/proceedings must be submitted electronically via the DOE Energy Link System (E-Link) at http://www.osti.gov/elink-2413. Non-scientific/technical conference papers/proceedings must be sent to the URL listed on the Reporting Checklist.

Electronic Format. Conference papers/proceedings must be submitted in the ADOBE PORTABLE DOCUMENT FORMAT (PDF) and be one integrated PDF file that contains all text, tables, diagrams, photographs, schematic, graphs, and charts. If the proceedings cannot be submitted electronically, they should be sent to the DOE Administrator at the address listed in Block 16 of the Assistance Agreement Cover Page.

Submittal Form. Scientific/technical conference papers/proceedings must be accompanied by a completed DOE Form 241.3. The form and instructions are available on E-Link at http://www.osti.gov/elink-2413. This form is not required for non-scientific or non-technical conference papers or proceedings.

Software/Manual

Content. Unless otherwise specified in the award, the following must be delivered: source code, the executable object code and the minimum support documentation needed by a competent user to understand and use the software and to be able to modify the software in subsequent development efforts.

Electronic Submission. Submissions may be submitted electronically via the DOE Energy Link System (E-Link) at http://www.osti.gov/estsc/241-4pre.jsp. They may also be submitted via regular mail to:

Energy Science and Technology Software Center
P.O. Box 1020
Oak Ridge, TN 37831

Submittal Form. Each software deliverable and its manual must be accompanied by a completed DOE Form 241.4, "Announcement of U.S. Department of Energy Computer Software." The form and instructions are available on E-Link at http://www.osti.gov/estsc/241-4pre.jsp.

Protected Personally Identifiable Information (PII). Management Reports or Scientific/Technical Reports must not contain any *Protected* PII. PII is any information about an individual which can be used to distinguish or trace an individual's identity. Some information that is considered to be PII is available in public sources such as telephone books, public websites, university listings, etc. This type of information is considered to be Public PII and includes, for example, first and last name, address, work telephone number, e-mail address, home telephone number, and general educational credentials. In contrast, *Protected* PII is defined as an individual's first name or first initial and last name in combination with any one or more of types of information, including, but not limited to, social security number, passport number, credit card numbers, clearances, bank numbers, biometrics, date and place of birth, mother's maiden name, criminal, medical and financial records, educational transcripts, etc.

C. FINANCIAL REPORTING

Recipients must complete the SF-425 as identified on the Reporting Checklist in accordance with the report instructions. A fillable version of the form is available at http://www.whitehouse.gov/omb/grants/grants_forms.aspx.

D. CLOSEOUT REPORTS

Final Invention and Patent Report

The recipient must provide a DOE Form 2050.11 , "PATENT CERTIFICATION." This form is available at http://management.energy.gov/business_doe/business_forms.htm

Final Property Report

See instructions under **SF-428 Tangible Personal Property Report Forms Family** below.

E. OTHER REPORTING

Annual Indirect Cost Proposal and Reconciliation

Requirement. In accordance with the applicable cost principles, the recipient must submit an annual indirect cost proposal, reconciled to its financial statements, within six months after the close of the recipient's fiscal year, unless the award is based on a predetermined or fixed indirect rate(s), or a fixed amount for indirect or facilities and administration (F&A) costs.

Cognizant Agency. The recipient must submit its annual indirect cost proposal directly to the cognizant agency for negotiating and approving indirect costs. If the DOE awarding office is the cognizant agency, submit the annual indirect cost proposal to https://www.eere-pmc.energy.gov/SubmitReports.aspx.

Audit of For-Profit Recipients

As required by 10 CFR 600.316, as supplemented by For-Profit Audit Guidance Parts I through IV, audits must be performed of For-Profit Recipients of financial assistance awards (prime awards) and sub-awards.

For-Profit Audit Guidance Parts I through IV to assist for-profit recipients in complying with the audit requirements of 10 CFR 600.316 are posted on the Financial Assistance Forms page of the MA home page under the 'Coverage of Independent Audits' subheading, http://management.energy.gov/business_doe/business_forms.htm.
Submission: For recipients, financial statement and compliance audit submissions are due to DOE within six months of the recipients' fiscal year-end dates. For sub-awardees, financial statement and compliance audit submissions are due to the pass-through entity within six months of the sub-awardees' fiscal year-end dates. For recipients, the compliance audits must be submitted, along with audited financial statements, to the appropriate DOE Contracting Officer at https://www.eere-pmc.energy.gov/SubmitReports.aspx as well as to the DOE Office of the Chief Financial Officer at DOE-Audit-Submission@hq.doe.gov

SF-428 Tangible Personal Property Report Forms Family

Requirement. The SF-428 is a forms family consisting of 5 forms: the SF-428, SF-428-A, SF-428-B, SF-428-C, and SF-428S. Fillable versions of the SF-428 forms are available at http://management.energy.gov/business_doe/business_forms.htm.

- The SF-428 is the cover page and the submitter attaches the appropriate form or forms as listed on the SF-428.
- The SF-428-A is the Annual report, due Oct. 30th of each calendar year.
- The SF-428-B is the Final Award Closeout Report, due at award completion.
- The SF-428-C is the Disposition Report/Request.

- The SF-428S is the supplemental form for the SF-428-A, SF-428-B and SF-428-C.

If at any time during the award the recipient is provided Government-furnished property or acquires property with project funds and the award specifies that the property vests in the Federal Government (i.e. federally owned property), the recipient must submit an annual inventory of this property to the DOE Administrator using the SF-428 and SF-428-A forms at the address on page 1 of this checklist no later than October 30th of each calendar year, to cover an annual reporting period ending on the preceding September 30th. The SF-428 and SF-428-B reports are required during closeout.

Content of Inventory. As required on the SF-428-A form, the inventory must include a description of the property, tag number, acquisition date, and acquisition cost, if purchased with project funds. The location of property should be listed under the Comments section. The report must list all federally owned property, including property located at subcontractor's facilities or other locations.

RESEARCH PERFORMANCE PROGRESS REPORT

Standard Cover Page Data Elements and Reporting Categories

The standard cover page data elements shown below, as well as mandatory and optional components comprise the complete research performance progress report format.

Each category in the RPPR is a separate reporting component. Each component is marked to indicate if it is optional or mandatory. Mandatory components must be addressed in each report, optional are at your discretion.

If you have nothing significant to report during the reporting period on a question or item, state "Nothing To Report".

1. COVER PAGE DATA ELEMENTS: Mandatory

- Federal Agency and Organization Element to Which Report is Submitted
- Federal Grant or Other Identifying Number Assigned by Agency
- Project Title
- PD/PI Name, Title and Contact Information (e-mail address and phone number)
- Name of Submitting Official, Title, and Contact Information (e-mail address and phone number), if other than PD/PI
- Submission Date
- DUNS Number
- Recipient Organization (Name and Address)
- Project/Grant Period (Start Date, End Date)
- Reporting Period End Date
- Report Term or Frequency (annual, semi-annual, quarterly, other)
- Signature of Submitting Official (electronic signatures (i.e., Adobe Acrobat) are acceptable)

2. ACCOMPLISHMENTS: Mandatory

What was done? What was learned?

The information provided in this section allows the agency to assess whether satisfactory progress has been made during the reporting period.

INSTRUCTIONS – Accomplishments

The PI is reminded that the grantee is required to obtain prior written approval from the Contracting Officer whenever there are significant changes in the project or its

direction. Requests for prior written approval must be submitted to the Contracting Officer (submission via Fedconnect is acceptable).

- What are the major goals and objectives of the project?
- What was accomplished under these goals?
- What opportunities for training and professional development has the project provided?
- How have the results been disseminated to communities of interest?
- What do you plan to do during the next reporting period to accomplish the goals and objectives?

What are the major goals of the project?

List the major goals of the project as stated in the approved application or as approved by the agency. If the application lists milestones/target dates for important activities or phases of the project, identify these dates and show actual completion dates or the percentage of completion.

Generally, the goals will not change from one reporting period to the next. However, if the awarding agency approved changes to the goals during the reporting period, list the revised goals and objectives. Also explain any significant changes in approach or methods from the agency approved application or plan.

What was accomplished under these goals?

For this reporting period describe: (1) major activities; (2) specific objectives; (3) significant results, including major findings, developments, or conclusions (both positive and negative); and (4) key outcomes or other achievements. Include a discussion of stated goals not met. As the project progresses, the emphasis in reporting in this section should shift from reporting activities to reporting accomplishments.

What opportunities for training and professional development has the project provided?

Describe opportunities for training and professional development provided to anyone who worked on the project or anyone who was involved in the activities supported by the project.

“Training” activities are those in which individuals with advanced professional skills and experience assist others in attaining greater proficiency. Training activities may include, for example, courses or one-on-one work with a mentor. “Professional development” activities result in increased knowledge or skill in one’s area of expertise and may include workshops, conferences, seminars, study groups, and individual study. Include participation in conferences, workshops, and seminars not listed under major activities.

How have the results been disseminated to communities of interest?

Describe how the results have been disseminated to communities of interest. Include any outreach activities that have been undertaken to reach members of communities who are not

usually aware of these research activities, for the purpose of enhancing public understanding and increasing interest in learning and careers in science, technology, and the humanities.

What do you plan to do during the next reporting period to accomplish the goals?

Describe briefly what you plan to do during the next reporting period to accomplish the goals and objectives.

3. PRODUCTS: [Optional/Mandatory]

What has the project produced?

Publications are the characteristic product of research. Agencies evaluate what the publications demonstrate about the excellence and significance of the research and the efficacy with which the results are being communicated to colleagues, potential users, and the public, not the number of publications.

Many projects (though not all) develop significant products other than publications. Agencies assess and report both publications and other products to Congress, communities of interest, and the public.

INSTRUCTIONS – Products

List any products resulting from the project during the reporting period. Examples of products include:

- Publications, conference papers, and presentations;
- Website(s) or other Internet site(s);
- Technologies or techniques;
- Inventions, patent applications, and/or licenses;
- Other products, such as data or databases, physical collections, audio or video products, software or NetWare, models, educational aids or curricula, instruments, or equipment; and

- Any other public release of information related to the project.

Publications, conference papers, and presentations

Report only the major publication(s) resulting from the work under this award. There is no restriction on the number. However, agencies are interested in only those publications that most reflect the work under this award in the following categories:

- **Journal publications.** List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Include any peer-reviewed publication in the periodically published proceedings of a scientific society, a conference, or the like. A publication in the proceedings of a one-time conference, not part of a series, should be reported under "Books or other non-periodical, one-time publications."

Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

- **Books or other non-periodical, one-time publications.** Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like.

  Identify for each one-time publication: author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (book, thesis or dissertation, other); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

- **Other publications, conference papers and presentations.** Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication as noted above.

Website(s) or other Internet site(s)

List the URL for any Internet site(s) that disseminates the results of the research activities. A short description of each site should be provided. It is not necessary to include the publications already specified above in this section.

Technologies or techniques

Identify technologies or techniques that have resulted from the research activities. Describe the technologies or techniques and how they are being shared.

Inventions, patent applications, and/or licenses

Identify inventions, patent applications with date, and/or licenses that have resulted from the research. Submission of this information as part of an interim research performance progress report is not a substitute for any other invention reporting required under the terms and conditions of an award.

Other products

Identify any other significant products that were developed under this project. Describe the product and how it is being shared. Examples of other products are:

- Databases;
- Physical collections;
- Audio or video products;
- Software or NetWare;
- Models;

- Educational aids or curricula;
- Instruments or equipment;
- Data & Research Material (e.g., cell lines, DNA probes, animal models); and
- Other.

4. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS: [Optional/Mandatory]

Who has been involved?

Agencies need to know who has worked on the project to gauge and report performance in promoting partnerships and collaborations.

INSTRUCTIONS - Participants & Other Collaborating Organizations

Provide the following information on participants:

- What individuals have worked on the project?
- What other organizations have been involved as partners?
- Have other collaborators or contacts been involved?

What individuals have worked on the project?

Provide the following information for: (1) principal investigator(s)/project director(s) (PIs/PDs); and (2) each person who has worked at least one person month per year on the project during the reporting period, regardless of the source of compensation (a person month equals approximately 160 hours of effort).

- Provide the name and identify the role the person played in the project. Do NOT include any other identifying information on individuals. Indicate the nearest whole person month (Calendar, Academic, Summer) that the individual worked on the project. Show the most senior role in which the person has worked on the project for any significant length of time. For example, if an undergraduate student graduates, enters graduate school, and continues to work on the project, show that person as a graduate student, preferably explaining the change in involvement.

- Describe how this person contributed to the project and with what funding support. If information is unchanged from a previous submission, provide the name only and indicate “no change”.

- Identify whether this person is collaborating internationally. Specifically is the person collaborating with an individual located in a foreign country and whether the person had traveled to the foreign country as part of that collaboration and duration of stay. The foreign country(ies) should be identified.

Example:

Name:	Mary Smith
Project Role:	Graduate Student
Nearest person month worked:	5
Contribution to Project:	Ms. Smith has performed work in the area of combined error-control and constrained coding.
Funding Support:	The Ford Foundation (Complete only if the funding provided from other than this award.)
Collaborated with individual in foreign country:	Yes
Country(ies) of foreign collaborator:	China
Traveled to foreign country:	Yes
If traveled to foreign country(ies), duration of stay:	5 months

What other organizations have been involved as partners?

Describe partner organizations – academic institutions, other nonprofits, industrial or commercial firms, state or local governments, schools or school systems, or other organizations (foreign or domestic) – that have been involved with the project. Partner organizations may provide financial or in-kind support, supply facilities or equipment, collaborate in the research, exchange personnel, or otherwise contribute.

Provide the following information for each partnership:

Organization Name:
Location of Organization: (if foreign location list country)
Partner's contribution to the project: (identify one or more)

- Financial support;
- In-kind support (e.g., partner makes software, computers, equipment, etc., available to project staff);
- Facilities (e.g., project staff use the partner's facilities for project activities);
- Collaborative research (e.g., partner's staff work with project staff on the project); and
- Personnel exchanges (e.g., project staff and/or partner's staff use each other's facilities, work at each other's site).

More detail on partner and contribution (foreign or domestic).

Have other collaborators or contacts been involved?

Some significant collaborators or contacts within the recipient's organization may not be covered by "What people have worked on the project?" Likewise, some significant collaborators or contacts outside the recipient's organization may not be covered under "What other organizations have been involved as partners?" For example, describe any significant:

- collaborations with others within the recipient's organization; especially interdepartmental or interdisciplinary collaborations;
- collaborations or contact with others outside the organization; and
- collaborations or contacts with others outside the United States or with an international organization.
- country(ies) of collaborations or contacts.

It is likely that many recipients will have no other collaborators or contacts to report.

5. IMPACT: [Optional/Mandatory]

What is the impact of the project? How has it contributed?

Over the years, this base of knowledge, techniques, people, and infrastructure is drawn upon again and again for application to commercial technology and the economy, to health and safety, to cost-efficient environmental protection, to the solution of social problems, to numerous other aspects of the public welfare, and to other fields of endeavor.

The taxpaying public and its representatives deserve a periodic assessment to show them how the investments they make benefit the nation. Through this reporting format, and especially this section, recipients provide that assessment and make the case for Federal funding of research and education.

Agencies use this information to assess how their research programs:
- increase the body of knowledge and techniques;
- enlarge the pool of people trained to develop that knowledge and techniques or put it to use; and
- improve the physical, institutional, and information resources that enable those people to get their training and perform their functions.

INSTRUCTIONS - Impact

This component will be used to describe ways in which the work, findings, and specific products of the project have had an impact during this reporting period. Describe distinctive contributions, major accomplishments, innovations, successes, or any change in practice or behavior that has come about as a result of the project relative to:

- the development of the principal discipline(s) of the project;
- other disciplines;
- the development of human resources;
- physical, institutional, and information resources that form infrastructure;
- technology transfer (include transfer of results to entities in government or industry, adoption of new practices, or instances where research has led to the initiation of a startup company); or
- society beyond science and technology.

What is the impact on the development of the principal discipline(s) of the project?

Describe how findings, results, techniques that were developed or extended, or other products from the project made an impact or are likely to make an impact on the base of knowledge, theory, and research and/or pedagogical methods in the principal disciplinary field(s) of the project. Summarize using language that an intelligent lay audience can understand (*Scientific American* style).

How the field or discipline is defined is not as important as covering the impact the work has had on knowledge and technique. Make the best distinction possible, for example, by using a "field" or "discipline", if appropriate, that corresponds with a single academic department (i.e., physics rather than nuclear physics).

What is the impact on other disciplines?

Describe how the findings, results, or techniques that were developed or improved, or other products from the project made an impact or are likely to make an impact on other disciplines.

What is the impact on the development of human resources?

Describe how the project made an impact or is likely to make an impact on human resource development in science, engineering, and technology. For example, how has the project:

- provided opportunities for research and teaching in the relevant fields;
- improved the performance, skills, or attitudes of members of underrepresented groups that will improve their access to or retention in research, teaching, or other related professions;
- developed and disseminated new educational materials or provided scholarships; or
- provided exposure to science and technology for practitioners, teachers, young people, or other members of the public?

What is the impact on physical, institutional, and information resources that form infrastructure?

Describe ways, if any, in which the project made an impact, or is likely to make an impact, on physical, institutional, and information resources that form infrastructure, including:

- physical resources such as facilities, laboratories, or instruments;
- institutional resources (such as establishment or sustenance of societies or organizations); or
- information resources, electronic means for accessing such resources or for scientific communication, or the like.

What is the impact on technology transfer?

Describe ways in which the project made an impact, or is likely to make an impact, on

commercial technology or public use, including:

- transfer of results to entities in government or industry;
- instances where the research has led to the initiation of a start-up company; or
- adoption of new practices.

What is the impact on society beyond science and technology?

Describe how results from the project made an impact, or are likely to make an impact, beyond the bounds of science, engineering, and the academic world on areas such as:

- improving public knowledge, attitudes, skills, and abilities;
- changing behavior, practices, decision making, policies (including regulatory policies), or social actions; or
- improving social, economic, civic, or environmental conditions.

What dollar amount of the award's budget is being spent in foreign country(ies)?

Describe what percentage of the award's budget is being spent in foreign country(ies). If more than one foreign country, identify the distribution between the foreign countries.

6. CHANGES/PROBLEMS: [Optional/Mandatory]

The PI is reminded that the grantee is required to obtain prior written approval from the Contracting Officer whenever there are significant changes in the project or its direction. Requests for prior written approval must be submitted to the Contracting Officer (submission via Fedconnect is acceptable). If not previously reported in writing, provide the following additional information, if applicable:

- Changes in approach and reasons for change.
- Actual or anticipated problems or delays and actions or plans to resolve them.
- Changes that have a significant impact on expenditures.
- Significant changes in use or care of animals, human subjects, and/or biohazards.

INSTRUCTIONS - Changes/Problems

Changes in approach and reasons for change

Describe any changes in approach during the reporting period and reasons for these changes. Remember that significant changes in objectives and scope require prior approval of the agency.

Actual or anticipated problems or delays and actions or plans to resolve them

Describe problems or delays encountered during the reporting period and actions or plans to resolve them.

Changes that have a significant impact on expenditures

Describe changes during the reporting period that may have a significant impact on expenditures, for example, delays in hiring staff or favorable developments that enable meeting objectives at less cost than anticipated.

Significant changes in use or care of human subjects, vertebrate animals, and/or Biohazards

Describe significant deviations, unexpected outcomes, or changes in approved protocols for the use or care of human subjects, vertebrate animals, and/or biohazards during the reporting period. If required, were these changes approved by the applicable institution committee and reported to the agency? Also specify the applicable Institutional Review Board/Institutional Animal Care and Use Committee approval dates.

Change of primary performance site location from that originally proposed

Identify any change to the primary performance site location identified in the proposal, as originally submitted.

7. SPECIAL REPORTING REQUIREMENTS: [Optional/Mandatory]

Respond to any special reporting requirements specified in the award terms and conditions, as well as any award specific reporting requirements.

8. BUDGETARY INFORMATION: [Optional/Mandatory]

This component will be used to collect budgetary data from the recipient organization. The information will be used in conducting periodic administrative/budgetary reviews. Budgetary data should be submitted in an Excel spreadsheet format.

Applicant Name: Sapphire Energy, Inc. Award Number: DE-EE0002884.005 Attachment 4

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. Budget Period 1	81.087			$9,970,000	Redacted Exemption 4	
2.						
3.						
4.						
5. Totals				$9,970,000		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	(1) Budget Period 1	(2)	(3)	(4)	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. Totals (sum of 6i-6j)					
7. Program Income	$0				$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Applicant Name: Sapphire Energy - BP1 Award Number: DE-EE0002884

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity	Catalog of Federal Domestic Assistance Number	Estimated Unobligated Funds		New or Revised Budget		
		Federal	Non-Federal	Federal	Non-Federal	Total
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1. IABR BP-1				$9,970,000	Redacted Exemption 4	
2. National Lab				$275,000		
3.						
4.						
5. Totals				$10,245,000		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	(1) IABR BP-1	(2) National Lab	(3)	(4)	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. **Totals** (sum of 6i-6j)					
7. Program Income	$0	$0			$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Applicant Name: Sapphire Energy - BP1, FY2010 Award Number: DE-EE0002884

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. IABR BP-1				$4,355,948	Redacted Exemption 4	
2.						
3.						
4.						
5. Totals				$4,355,948		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	(1) IABR BP-1	(2)	(3)	(4)	
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. **Totals** (sum of 6i-6j)					
7. Program Income	$0				$0

Applicant Name: Sapphire Energy - BP1, FY2011 Award Number: DE-EE0002884

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds: Federal (c)	Estimated Unobligated Funds: Non-Federal (d)	New or Revised Budget: Federal (e)	New or Revised Budget: Non-Federal (f)	New or Revised Budget: Total (g)
1. IABR BP-1				$5,889,052	Redacted Exemption 4	
2.						
3.						
4.						
5. Totals				$5,889,052		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity (1) IABR BP-1	(2)	(3)	(4)	Total (5)
a. Personnel	Redacted Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges					
k. **Totals** (sum of 6i-6j)					
7. Program Income	$0				$0

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Instructions and Summary

Award Number: DE-EE0002884
Award Recipient: Sapphire Energy, Inc.

Date of Submission: 6/15/2011
Form submitted by: Sapphire Energy, Inc.
(May be award recipient or sub-recipient)

Please read the instructions on each page before starting.
If you have any questions, please ask your DOE contact. It will save you time!

On this form, provide detailed support for the estimated project costs identified on the SF-424A form (Budget).

- **The dollar amounts on this page must match the amounts on the associated SF-424A.**
- **The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and a SF-424A form.**
- **The total budget presented on this form and on the SF424A must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.**
- **For costs in each Object Class Category on the SF-424A, complete the corresponding worksheet on this form (tab at the bottom of the page).**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.**

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

CATEGORY	Budget Period 1 Costs	Budget Period 2 Costs	Budget Period 3 Costs	Total Costs	Project Costs %	Comments (Add comments as needed)
a. Personnel						
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
Sub-recipient						
FFRDC						
Vendor						
Total Contractual						
g. Construction						
h. Other Direct Costs						
i. Indirect Charges						
Total Project Costs						

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

a. Personnel

PLEASE READ!!!

List costs solely for employees of the entity completing this form (award recipient or sub-recipient). All other personnel costs (of subrecipients or other contractual efforts of the entity preparing this) must be included under f., Contractual. This includes all consultants and FFRDCs.

Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the composite base pay rate, total direct personnel compensation and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

Task # and Title	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hours)	Pay Rate ($/Hr)	Total Budget Period 3			
Sapphire Project Management and Engineering													
	Redacted Exemption 4												

Additional Explanations/Comments (as necessary)

b. Fringe Benefits

	Budget Period	Budget Period	Budget Period	Total
Rate applied:	Redacted Exemption 4			
Total fringe requested:				

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information. Calculate the fringe rate and enter the total amount in Section B, line 6.b. ("Fringe Benefits") of form SF-

_____ **A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.**
**In the area designated below, identify the full calculations used to derive the total fringe costs. See further information below.*

X **There is not a current, federally approved rate agreement negotiated and available.**
*When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal. * In the area designated below, identify the full calculations used to derive the total fringe costs. See further information below.*

Additional explanation/comments (as necessary)

*IMPORTANT: In the space provided below (or as an attachment) provide a complete explanation and the full calculations used to derive the total fringe costs. If the total fringe costs are a cumulative amount of more than one calculation or rate application, the explanation and calculations should identify all rates used, along with the base they were applied to (and how the base was derived), and a total for each (along with grand total). The rates and how they are applied should not be averaged to get one fringe cost percentage. NOTE: The fringe benefit rate should be applied to both the Federal Share and Recipient Cost Share.

	Base Subtotal	General Fringe (Ex.4%)	R&D Staff OH (Ex. 4 %)	Fringe Totals
R&D Staff	Redacted Exemption 4			
Non R&D Staff				

c. Travel

PLEASE READ!!!

Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.

All listed travel must be necessary for performance of the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Purpose of travel	No. of Travelers	Depart From (not required for domestic travel)	Destination (not required for domestic travel)	No. of Days	Cost per Traveler	Cost per Trip	Basis for Estimating Costs
Budget Period 1							
Domestic Travel							
Redacted Exemption 4							
International Travel							
International Travel subtotal							
Budget Period 1 Total							
Budget Period 2							
Domestic Travel							
Domestic Travel subtotal						$0	
International Travel							
International Travel subtotal						$0	
Budget Period 2 Total						**$0**	
Budget Period 3							
Domestic Travel							
Domestic Travel subtotal						$0	
International Travel							
International Travel subtotal						$0	
Budget Period 3 Total						**$0**	
PROJECT TOTAL						Ex. 4	

Additional Explanations/Comments (as necessary)

d. Equipment

PLEASE READ!!!

Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .
List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
Pretreatment Unit	Redacted Exemption 4				
Extraction Unit					
Budget Period 1 Total					
Budget Period 2 Total					
Budget Period 3 Total					
PROJECT TOTAL					

Additional Explanations/Comments (as necessary)

e. Supplies

PLEASE READ!!!

Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.

List all proposed supplies below, providing a bases of cost such as vendor quotes, catalog prices, prior invoices, etc., and briefly justifying the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1					
Design Office Printing Supplies					
Design Office Bid Packages					
Budget Period 1 Total					
Budget Period 2 Total					
Budget Period 3 Total					
PROJECT TOTAL					

Redacted Exemption 4

Additional Explanations/Comments (as necessary)

f. Contractual

PLEASE READ!!!

The entity completing this form must provide all costs related to sub-recipients, vendors, contractors, consultants and FFRDC partners in the applicable boxes below.

Sub-recipients (partners, sub-awardees):

For each sub-recipient with total project costs of $100,000 or more, a separate SF-424A budget and PMC123.1 budget justification form must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipient entries below.

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Vendors (includes contractors and consultants):

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

Federal Research and Development Centers (FFRDCs):

For FFRDC partners, award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Change	Budget Period 1 Revised Costs (to Date)	(to Go)	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
NMSU	Redacted Exemption 4							

Vendor Name/Organization	Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed)	Budget Period 1 Costs	Change	Budget Period 1 Revised Costs (to Date)	(to Go)	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
Luna County Electrical Coop	Redacted Exemption 4							
Harris Group								
Brown and Caldwell								

Sub-Recipient Name/Organization	Purpose/Tasks in SOPO	Budget Period 1 Costs	Change	Budget Period 1 Revised Costs (to Date)	Budget Period 1 Revised Costs (to Go)	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
	Redacted Exemption 4							
Geomatrix								
Geomatrix								
Autodesk								
Geomatrix								
Harris Group								
Brown and Caldwell								
Various								
Geomatrix								
Geomatrix								
Harris Group								
Brown and Caldwell								
AMEC plc								
AMEC plc								

FFRDC Name/Organization	Purpose	Budget Period 1 Costs	Change	Budget Period 1 Revised Costs (to Date)	Budget Period 1 Revised Costs (to Go)	Budget Period 2 Costs	Budget Period 3 Costs	Project Total
SNL	Redacted Exemption 4							
Total Contractual								

Additional Explanations/Comments (as necessary)

g. Construction

PLEASE READ!!!

Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient to the award recipient should be entered under f. Contractual.

List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Overall description of construction actiivities:

General Description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Budget Period 1 Total	**$0**		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

h. Other Direct Costs

PLEASE READ!!!

Other direct costs are direct cost items required for the project which do not fit clearly into other categories, and are not included in the indirect pool for which the indirect rate is being applied to this project. Examples are meeting costs, postage, couriers or express mail, telephone/fax costs, printing costs, etc.

Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

General description	Cost	Basis of Cost	Justification of need
Budget Period 1			
Budget Period 1 Total	$0		
Budget Period 2			
Budget Period 2 Total	$0		
Budget Period 3			
Budget Period 3 Total	$0		
PROJECT TOTAL	**$0**		

Additional Explanations/Comments (as necessary)

i. Indirect Costs

	Budget Period 1	Budget Period 2	Budget Period 3	Total
Rate applied:	Redacted Exemption 4			
Total indirect costs requested:				

A federally approved indirect rate agreement, or rate proposed supported and agreed upon by DOE for estimating purposes is required if reimbursement of fringe benfits is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed. Calculate the indirect rate dollars and enter the total in the Section B., line 6.j. (Indirect Charges) of form SF 424A.

_____ **There is a federally approved indirect rate agreement. A copy is provided with this application and will be provided electronically to the Contracting Officer for this project.**
**In the area designated below, identify the full calculations used to derive the total indirect costs. See further information below.*

X **There is no current, federally-approved indirect rate agreement.**
*When this option is checked, the entity preparing this form shall submit an indirect cost rate proposal in the format provided at the following website, or in a format that provides the same level of information and which supports the rate(s) being proposed for use in estimating the project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select PMC 400.2 Sample Rate Proposal. *In the area designated below, identify the full calculations used to derive the total indirect costs. See further information below.*

Additional Explanations/Comments (as necessary)

*IMPORTANT: In the space provided below (or as an attachment) provide a complete explanation and the full calculations used to derive the total indirect costs. If the total indirect costs are a cumulative amount of more than one calculation or rate application, the explanation and calculations should identify all rates used, along with the base they were applied to (and how the base was derived), and a total for each (along with grand total). The rates and how they are applied should not be averaged to get one indirect cost percentage. NOTE: The indirect rate should be applied to both the Federal Share and Recipient Cost Share.

Cost Share

PLEASE READ!!!

A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor. Letters of committment must be submitted for all third party cost share (other than award recipient).

Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget as incurred as part of the project budget and necessary to performance of the project, may be considered as cost share, such as: contribution of services or property; donated, purchased or existing equipment; buildings or land; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.

Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.

Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

Organization/Source	Type (cash or other)	Cost Share Item	Budget Period 1 Cost Share	Budget Period 2 Cost Share	Budget Period 3 Cost Share	Total Project Cost Share
Sapphire Energy	Redacted Exemption 4					

Total Project Cost: $ Redacted Exemption 4 **Cost Share Percent of Award:** Ex. 4

Additional Explanations/Comments (as necessary)

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

DOE/EA-1688

FINDING OF NO SIGNIFICANT IMPACT

Sapphire Energy, Inc. Integrated Algal Biorefienry Project in Columbus, New Mexico

AGENCY: Department of Energy, Golden Field Office

ACTION: Adoption of the United States Department of Agriculture Environmental Assessment and a Department of Energy Finding of No Significant Impact

SUMMARY: The United States Department of Energy (DOE) is proposing to provide up to $43 Million in Federal funding to Sapphire Energy, Inc. (Sapphire) for the final design, construction and initial operation of their Integrated Algal Biorefinery (IABR) project near Columbus, New Mexico. The Environmental Assessment (EA) completed by the United States Department of Agriculture (USDA) analyzed the potential environmental impacts associated with the proposed IABR project. The EA was completed by the USDA in response to a loan guarantee application submitted to USDA Rural Development in Albuquerque, New Mexico. All discussion, analysis, and findings related to the potential impacts of construction and operations of the IABR, are contained in the Final EA. Based on the EA, the USDA completed a Finding of No Significant Impact (FONSI), which was published in September 2009. DOE has analyzed USDA's EA, conducted follow-on consultation, and determined the EA to be adequate and satisfactory in describing the proposed project and the potential environmental impacts. Accordingly, DOE adopts the EA and incorporates it by reference into this FONSI.

The scope of the Sapphire IABR project would include the following:

- Construction of a demonstration-scale facility capable of producing 100 barrels per day of refined algal oil.
- Operation of the IABR includes:
  - Propagation and harvesting of algal biomass
  - Extraction of algal oil and conversion to liquid fuels
  - Operation for a three year test period (potentially 2 additional years may be required to obtain required data).
- Decommissioning of the facility includes:
  - Buildings and other permanent structures that can be reused for general industry would be cleaned and left in place
  - Process equipment would be removed and salvaged
  - Other land area would be returned to predevelopment conditions

This FONSI was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality Regulations for Implementing NEPA, as amended, 40 CFR 1500-1508, and Department of Energy NEPA Regulations 10 CFR 1021.322.

This FONSI supports DOE's cost-shared funding of the final design, construction and operation of the Sapphire Energy Inc. IABR project southwest of Columbus, New Mexico.

ENVIRONMENTAL IMPACTS ANALYSIS: In compliance with NEPA (42 U.S.C. 4321), USDA's EA examines the potential environmental impacts of a decision to provide a loan guarantee for the proposed project. Under the No Action Alternative, the USDA would not provide a loan guarantee and the project would not be built. The USDA FONSI included mitigation measures that have been met by Sapphire. As part of the adoption process, DOE reviewed USDA's EA for consistency with DOE's NEPA implementing regulations. USDA's environmental impact analyses are summarized as follows and would be entirely consistent with the impacts associated with a DOE decision to provide federal funding to Sapphire.

The proposed IABR project would be constructed on approximately 400 acres of land that was previously used for traditional agriculture and replace it with non-traditional agriculture use. The Natural Resource Conservation Service (NRCS) has verified that no prime farmland, unique, statewide or locally designated cropland is located within the proposed project area, and sufficient agricultural land is available in Luna County for traditional agriculture. Though soil in the area has been classified as highly erodible, activities associated with the project would not increase soil erosion, and best management practices would be employed to minimize ground disturbance.

No floodplains, wetlands, or other waterways of the United States, rivers included in the National Wild and Scenic Rivers Systems, or unique sensitive areas have been identified within the proposed project area. Therefore, no impact to such waters or areas would result from the proposed project.

Discharges to air would not cumulatively result in adverse impacts to air resources. Air emissions from the proposed facility include heat and hydrocarbons from the steam boiler, carbon dioxide (CO2) from the ponds (6,720 metric tons annually), particulates associated with facility construction and truck traffic during operation, and hexane. Air impacts associated with the IABR would be within guidelines included in New Mexico's air quality implementation plan and comply with air quality standards in the region (including the country of Mexico). An air permit is required by the State of New Mexico before construction of the facility, and the determination for a New Source Review or Clean Air Act (CAA) Title V permit would be completed once final designs for the IABR are completed.

Permit requirements ensure minimal impacts to water resources. Approximately 1,900 acre feet of water per year would be used to maintain the ponds (extracted from existing wells); approximately 97 percent would be recaptured during water separation process and the remaining three percent would be retained within the system. The IABR would generate little wastewater; discharges would include water leakage from pond bottoms and line evaporation ponds, storm water, and septic waste from office septic system. No wastewater would be discharged to surface water. Discharge permits would be approved by the New Mexico Environmental Department (NMED). Total dissolved solids (TDS) is the primary constituent of concern associated with the proposed project. It is anticipated that the impact to groundwater would be an addition of 180 mg/L to the existing TDS concentration on the aquifer, which would achieve compliance with New Mexico standards.

The project requires water rights of approximately 3,000 acre feet per year, which would be comprised of a combination of existing water rights and long term leasing rights from adjacent properties. No impacts to water rights of neighbors would result from the IABR project.

No hazardous wastes would be generated by the IABR facility. A small volume of solid waste would be generated from the office, and wastes from the anaerobic digester would be disposed off site in accordance with all applicable regulations.

Transportation impacts include increased vehicle traffic and wear on existing infrastructure during construction and operation of the IABR. During operation, an estimated 30 workers would commute from surrounding communities. Impacts also include those associated with transport of algal oil to the IABR refinery by truck and the existing rail facility in Deming, New Mexico, solid waste collection for the anaerobic digester solid (20-30 round trips per week), CO2 transport, and other related truck trips for supplies. The New Mexico Department of Transportation (NMDOT) was contacted to solicit input on transportation impacts; no comments were received. Trips would be combined, car pooling, and buses would be utilized to reduce impacts. Transportation impacts would be mitigated through implementation of best management practices.

The USDA, with concurrence from the United States Fish and Wildlife Service (USFWS), found no adverse affects to threatened and endangered species associated with the proposed project. However, the USFWS recommends minimizing impacts to birds protected under the Migratory Bird Treaty Act by avoiding construction during bird nesting season or that areas to be constructed during nesting season are surveyed. The USFWS also recommended mitigation measures to reduce potential impacts to burrowing owls.

No significant impact to energy supplies would occur as a result of the proposed project. Sapphire would use conservation best management practices and engineering controls to reduce energy consumption to the greatest extent possible. No impacts to noise, vibration, or aesthetics are anticipated.

No impacts to cultural or historical resources are anticipated in the proposed area and the IABR would not affect any land identified in the Farmland Protection Policy Act.

The proposed area qualifies as an environmental justice population. However, cumulative impacts on socioeconmics would be positive, with the addition of high paying jobs and economic growth through purchase of goods and services from local and regional markets. No negative impacts are anticipated. The project may increase demand on local emergency and security services. Sapphire would secure additional services to overcome the shortfall.

The microorganisms intended for use in this project are not defined as genetically modified microorganisms (GMOs) according to Section 5 under the Toxic Substances Control Act (TSCA). They are also not defined as intergeneric (defined by EPA as "those microorganisms formed by combining genetic material from organisms in different genera" and therefore do not have precommercial notice and permitting requirements under the Section 5 of the Toxic Substances Control Act (TSCA). If, during the DOE project period, Sapphire proposes to use any microorganisms that are defined as GMOs, DOE will conduct a supplemental environmental review of those activities.

PARTICIPATION IN THE EA PROCESS: A preliminary notice of the EA was published in August 19, 20, and 21, 2009 by the USDA. No comments were received at the conclusion of the 30-day review period. On June 1, 2010 the DOE sent notice to potentially interested parties providing an additional comment opportunity to potentially interested local, state, and Federal agencies, including the New Mexico Water and Waste Water Division, the New Mexico Energy, Minerals, Forestry, and Resources Conservation Division, the Air Quality Bureau (AQB) of the New Mexico Environment Department, the Bureau of Land Management (BLM) Las Cruces Office, the Environmental Protection Agency Region 6 Office, New Mexico Game and Fish, District 1 of the New Mexico Department of Transportation, the NRCS Farm Service Agency of the USDA, the New Mexico Office of the State Engineer, the New Mexico State Historic Preservation Office (SHPO), the United States Fish and Wildlife Service (USFWS), and the United States Army Corps of Engineers (USACE) Construction Operations Division. DOE received acknowledgement of the notice and no additional comments regarding the proposed project from four state and federal agencies: USFWS, USACE, BLM, and SHPO. AQB acknowledged receipt of the notice and emphasized the importance of obtaining an air quality permit or a Notice of Intent prior to construction of the facility.

DETERMINATION: Based on the review of USDA's EA, DOE determines that providing Federal funding to support the final design, construction, and initial operation of the IABR would not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the NEPA.

Therefore, the preparation of an Environmental Impact Statement is not required, and DOE hereby adopts the USDA Environmental Assessment for Sapphire Energy Inc.'s Integrated Algal Biorefinery project and issues this FONSI.

The Final USDA EA is available for review at:
http://www.rurdev.usda.gov/rhs/pss/EnvironmentalDocuments.htm.

For questions about this FONSI please contact:

Kristin Kerwin, NEPA Compliance Officer
DOE Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393
kristin.kerwin@go.doe.gov

For further information on the DOE NEPA Process contact:

Office of NEPA Policy and Compliance
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585
(202) 586-4600 or (800)-472-2756

Issued in Golden, Colorado, the 4th Day of August, 2010.

Derek Passarelli
Acting Golden Field Office Manager

PMC-EF2a
(2.04.02)

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: Sapphire Energy, Inc. **STATE:** CA

PROJECT TITLE : Integrated Algal Biorefinery (IABR) BP1

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-PS36-09G099038	EE0002884	GFO-10-365	EE2884

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

A9 Information gathering (including, but not limited to, literature surveys, inventories, audits), data analysis (including computer modeling), document preparation (such as conceptual design or feasibility studies, analytical energy supply and demand studies), and dissemination (including, but not limited to, document mailings, publication, and distribution; and classroom training and informational programs), but not including site characterization or environmental monitoring.

B3.1 Onsite and offsite site characterization and environmental monitoring, including siting, construction (or modification), operation, and dismantlement or closing (abandonment) of characterization and monitoring devices and siting, construction, and associated operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis. Activities covered include, but are not limited to, site characterization and environmental monitoring under CERCLA and RCRA. Specific activities include, but are not limited to:

B3.11 Outdoor tests and experiments for the development, quality assurance, or reliability of materials and equipment (including, but not limited to, weapon system components), under controlled conditions that would not involve source, special nuclear, or byproduct materials. Covered activities may include, but are not limited to, burn tests (such as tests of electric cable fire resistance or the combustion characteristics of fuels), impact tests (such as pneumatic ejector tests using earthen embankments or concrete slabs designated and routinely used for that purpose), or drop, puncture, water-immersion, or thermal tests

B3.6 Siting, construction (or modification), operation, and decommissioning of facilities for indoor bench-scale research projects and conventional laboratory operations (for example, preparation of chemical standards and sample analysis); small-scale research and development projects; and small-scale pilot projects (generally less than two years) conducted to verify a concept before demonstration actions. Construction (or modification) will be within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible).

Rational for determination:

DOE is proposing to provide federal funding to Sapphire Energy to design and build an Integrated Algal Biorefinery (IABR) in Columbus, NM. This project has been divided into 2 budget periods (BP) separated by a DOE go/no go decision point. A NEPA decision is required for both BP1 and BP2. This NEPA determination applies to BP1 only.

BP1 consists of 6 tasks: a) feasibility study; b) conceptual analysis; c) process design; d) front end engineering design; e) research and development; and f) project management and reporting.

The research and development task consists of geotechnical and hydrological studies to be completed at the proposed project site for permitting purposes. The geotechnical and hydrology studies can be characterized as both site characterization and outdoor tests and experiments for reliability of materials. Both CX B3.1 and B3.11 apply to the geotechnical and hydrological studies with application of the required mitigation measures listed below.

The USDA completed an Environmental Assessment and issued a Finding of No Significant Impact (FONSI) for the project proposed by Sapphire. During the preparation of the EA, USDA consulted appropriate agencies and organizations as required by NEPA and other requirements. Of note, the State Historical Preservation Officer concurred with the USDA's "Determination of No Affect" and the NM State Soil Scientist determined that the site contains no prime, unique, statewide or locally designated farmland. The USDA FONSI included 4 mitigative measures. Mitigative measures 1 and 2 listed in the FONSI are required to be performed priot to completing the ground disturbing activities defined in BP1. Per mitigative measure 3, USACE has confirmed that there are no jurisdictional wetlands or waterways located on the property.

CX A9, B3.6, B3.1 and B3.11 apply to Budget Period 1, with the required mitigation applied.

NEPA PROVISION

DOE has made a conditional NEPA determination for this award, and funding for certain tasks under this award is contingent upon the final NEPA determination.

Insert the following language in the award:

You are restricted from taking any action using federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE/NNSA providing either a NEPA clearance or a final NEPA decision regarding the project.

Prohibited actions include:
BP1 ground disturbing activities are prohibited until mitigative measures 1 and 2 from the USDA FONSI are met.

Also, final design, capital equipment purchase, site preparation, construction and operation activities are prohibited at this time.

This restriction does not preclude you from:
Budget Period 1 activities.
If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

Insert the following language in the award:

You are required to:
1. Minimize the likelihood of adverse impacts to birds protected under the Migratory Bird Treaty Act by completing nesting bird surveys in areas to be disturbed during BP1. If nesting birds occupy the area to be disturbed during BP1, all ground disturbing activities should be avoided until nesting is complete.

2. Coordinate with USFWS and NMDFG in order to minimize potential impacts to any burrowing owls located on the site, if present, as outlined in the "Guidelines and Recommendations for Burrowing Owl Surveys and Mitigation" (July 2007)

Results of the nesting bird and burrowing owl surveys must be submitted to DOE for review and approval prior to DOE or cost share funds being applied to any ground disturbing activities.

Note to Specialist :

None Given.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Kristin Kerwin Date: 4/28/2010
NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

☐ Field Office Manager review required

NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____
Field Office Manager

PMC 120.1
(12/09)

U.S. DEPARTMENT OF ENERGY
GOLDEN FIELD OFFICE

FINANCIAL ASSISTANCE COMBINED COST/TECHNICAL EVALUATION AND NEGOTIATION MEMORANDUM

SECTION I - GENERAL INFORMATION

This technical evaluation/negotiation memorandum will be prepared jointly by the assigned DOE/Golden OCPM AND OAFA personnel, to document the specific action being evaluated and supported. Each office is responsible for certain sections of this document. The assigned OCPM and OAFA personnel responsible for the action will both sign this document upon its completion, demonstrating their agreement on its contents.

1. Recipient: Sapphire Energy, Inc.

2. Grant/Cooperative Agreement No.: DE-EE0002884 Modification No. 005
   Requisition No: 11EE005226
   Project Title: Recovery Act - Sapphire Integrated Algal Biorefinery (IABR)

3. Type of Action: ☐ New Award ☐ Renewal ☐ Continuation ☒ Revision
   Description of this Action: (NOTE: Indicate what is addressed by this Action only):

The purpose of this action is to move additional scope and funding from Budget Period 2 into Budget Period 1 for the Sapphire Energy, Inc. (DE-EE0002884) project entitled, "Recovery Act - Sapphire Integrated Algal Biorefinery (IABR)." Specifically, this action approves the statement of project objectives and budget associated with the revised Budget Period 1 activities for the prime recipient, vendors, and FFRDC. This action also extends the end of Budget Period 1 until December 31, 2011. The total approved budget for Budget Period 1 is $ Ex.4 The total DOE share is $10,245,000 which includes $275,000 already obligated to the FFRDC (Sandia National Laboratories), and the total cost share is $ Ex.4 The reporting requirements are also being updated with this action.

4. Award type, as determined at Procurement Strategy Meeting (for new awards): ☐ Grant ☒ Cooperative Agreement
   If Cooperative Agreement, provide the specifics of the Substantial Involvement. (Note: This language will be used in the Substantial Involvement provision of the award.):

1. Government Insight
   In order to adequately monitor project progress and provide technical direction and/or redirection to the Recipient, DOE must be provided an adequate level of insight into various Recipient activities. Government Insight activities by DOE include attendance at Recipient meetings, reviews and tests, as well as access for DOE's consultants to perform independent evaluations of Recipient's plans and processes. Recipient shall notify the DOE Project Officer of meetings, reviews, and tests in sufficient time to permit DOE participation, and provide all appropriate documentation for DOE review.

2. Specific activities to be conducted by DOE:
   a. Risk Evaluation – DOE will review the Recipient's initial Risk Mitigation Plan (RMP) for quality and completeness. DOE will also monitor updates to the RMP and actions taken by the Recipient during the performance of its award to mitigate risks and improve the probability of successful execution of the integrated Biorefinery project. At DOE's discretion, additional independent risk analyses of the project by DOE consultants may be requested.
   b. Independent Engineering Assessments – DOE will engage a private, independent engineering (IE) firm to assist in assessing the progress of the project and provide timely and accurate reports to DOE. The Recipient will ensure that the IE has access to any and all relevant documentation sufficient to allow the IE to provide independent evaluations to DOE on the progress of the project. Such documentation includes but is not limited to the following:
      - Drawings and specifications
      - Construction and Execution plans
      - Resource loaded schedules
      - Design functions and requirements for the site final design review
      - Risk management plans

- Value management and engineering studies and/or plans
- Acquisition strategies
- Project execution plans
- Project controls including earned value management systems
- Qualifications of the integrated project team.
- Financial strategy for funding the construction project
- Updated marketing and business plan
- Invoices submitted to DOE

DOE will evaluate the quality and completeness of information and documentation provided by the Recipient to DOE and its consultants in order to allow DOE to provide technical direction and/or redirection to the Recipient about how best to achieve the purposes of the award. Consultants to DOE may not provide technical direction and/or redirection to the Recipient.

5. New/Revised Project Period for this Award: From: 12/29/2009 To: 09/30/2014
   New/Revised Budget Period 1 for this Award: From: 12/29/2009 To: 12/31/2011
   New/Revised Budget Period 2 for this Award: From: 01/01/2012 To: 09/30/2014

6. Compliance Assessment (skip if new award):
   a. Deliverables
   The Recipient is current in submitting required reports: ☒ Yes ☐ No
   If no, identify the delinquent report(s), indicate what action(s) have been taken to remedy the situation, and identify what further action(s) are necessary, if any:

N/A

   b. Financial
   The Recipient is current in meeting the cost share requirement: ☒ Yes ☐ No
   If no, indicate what action(s) have been taken to remedy the situation and validate why this new action should proceed:

N/A

7. Check the applicable box for Funding Appropriation:
   ☒ Energy and Water ☐ Other _____

8. Check the applicable box for Statutory Authority:
   ☒ 109-58, Energy Policy Act 2005
   ☐ 110-140, Energy Independence and Security Act 2007
   ☒ ARRA
   ☐ Other: _____

9. Per 10 CFR 600, the preferred payment method for State/Local Governments, Institutions of Higher Education, Hospitals, or Other Non-Profit Organizations is **Advance**. The preferred Payment Method for For-Profit organizations is **Reimbursement**. Please state the payment method that will be used for this award in the box below. If the preferred payment method is not planned for a new award, provide an explanation below. Also, explain below if the payment method for the award is being changed by this action. If the ACH or the "ASAP Approval Required" payment methods is required, include an explanation for the restriction.

The recipient will remain on the ACH payment method.

10. Is the proposed Recipient on the debarred or suspended list? Yes ☐ No ☒
    Are any of the proposed subrecipients/subcontractors on the debarred or suspended list? Yes ☐ No ☒
    Is the Project Director on the debarred or suspended list? Yes ☐ No ☒
    If yes for either response above, award cannot be made without obtaining a waiver. See attached waiver.
    The review was conducted on the Internet on 08/25/2011 (Include Printout in permanent STRIPES file)

11. A risk determination has been completed on the PMC Form 460.2 Yes ☐ N/A ☒

12. Negotiation:

	Government Negotiator(s)		Recipient Negotiator(s)	
	Name	Organization	Name	Position
1.	Molly Hames	Grants Management Specialist	Jaime Moreno	Vice President
2.	Christy Sterner	Project Officer	Dave Marsh	Engineer
3.	Christine English	CN-JV Project Engineer		

SECTION II – NEGOTIATION SUMMARY

1. Please record any significant application or budget submissions that resulted in a revised budget in the Negotiation History Table below (including SF424A, budget justifications, e-mails, etc.):

Application/Budget Submission	Reference Document (s)	Date of Submission	Summary of Change
Original		4/4/2010	
Revision 1	123.1, 424A, SOPO	6/20/2011	Updated personnel, fringe, contractual, and indirect cost categories. SOPO updated to include additional activities.
Revision 2	backup	6/23/2011	Submitted contractual backup documentation
Final	123.1	6/29/2011	Updated contractual and equipment.

2. Complete Budget Table below (only include the original budget and final negotiated costs – the Percent of Total Negotiated Budget will calculate automatically)
Note: List proposed amounts by category even if there are no differences in the dollar amount.

Element of Cost	Originally Approve Budget Period 1 Submission (002 modification)	Final Budget Period 1 Negotiated Costs (005 modification)	Percent of Total Negotiated Budget	Fringe Benefits and Indirects	
				Proposed Rate	Negotiated Rate
Personnel Fringe Benefits Travel Equipment Supplies Contractual Construction Other	Redacted Exemption 4				
Total Direct Charges Indirect Charges					
TOTAL					
Program Income					
DOE Share (non-FFRDC) DOE Share (FFRDC) Total DOE Share	$6,503,098 $275,000 $6,778,098	$9,970,000 $275,000 $10,245,000	Redacted Ex.4		
Non-Federal Cost Share	Redacted Exemption 4				

SEE ATTACHED SF 424A FOR BUDGET PERIOD BREAKDOWN

3. Total Allowable Adjustment without Concurrence from the Selection Official per the Selection Statement: 10%
Actual Total Adjustment based on Budget Table Above: 0%
Is the original budget the same as the negotiated budget: ☐ Yes ☒ No
If No, please check all boxes that apply:
☒ Change in the Project Scope
☐ Changes due to Time Delays
☐ Math Errors in Budget
☐ Changes in Indirect/Fringe Costs Caused Changes in Direct Costs or Total Project Costs
☐ Indirect/Fringe Rates incorrectly applied
☒ Other (explain): _____

4. Briefly describe and explain any substantial change(s) to the original Statement of Project Objectives submitted by the recipient:

Project Officer commentary:
The Statement of Project Objectives has been updated to include tasks that will now be performed in Budget Period 1, instead of Budget Period 2. The majority of these tasks will be performed by a subcontractor and include preparative earthwork that is necessary for timely construction of the IABR facility.

SECTION III – TECHNICAL EVALUATION SUMMARY

A. For each cost category, the Project Officer and the Specialist will complete his/her Technical Evaluation of the Negotiated Costs to confirm that they are all reasonable, allowable, and allocable. Additional comments should be added as necessary and as indicated below.

1. Personnel:

Total Negotiated BP1 Personnel Costs: $Ex. 4	Not Applicable, the recipient did not propose Personnel costs: ☐

Project Officer:

Originally Approved BP1 Personnel: $ Redacted Exemption 4

Final Approved BP1 Personnel: $

The labor hours proposed in the negotiated budget are reasonable for the scope of work: ☒

The types of labor and labor mix proposed in the negotiated budget is reasonable: ☒

The proposed labor rates are reasonable: ☒

The personnel that have been included in the revised BP1 budget include a principal engineer, a principal R&D scientist, a project director, a project manager, a project engineer, a project controls manager, R&D technician I and II, and a project administrator. The type of personnel that have been included in this revised budget reflect the actual personnel that have been working on the project throughout Budget Period 1 as well as the personnel that will continue working on the project until Budget Period 2 is approved.

The types of personnel that have been included are reasonable for the scope of work that is being performed. It is reasonable that principal and project engineers are included in the budget to work on completion of the final designs for the IABR. In addition, a small number of hours has been included (150 hours) for the principle R&D scientist and R&D technicians to work on the project; these personnel will be necessary to assist with and perform the data analysis that will result from testing the temporary construction water wells and determine if they are causing detrimental effects on the neighboring water wells. The project administrator will continue to be responsible for organizing the reporting documents and invoices. The project director and project manager are instrumental positions necessary for managing the entire project and will continue in their roles as they have been throughout Budget Period 1.

Specialist:

Please fill out the following table with the negotiated costs:

Labor Type	Revised Budget Period 1		
	Hours	Rate	Total
Redacted Exemption 4			

Negotiated labor rates are reasonable: ☒

Labor rates are loaded rates (with fringe benefits or overhead costs): ☐

Please detail the basis for the reasonable determination:

The personnel costs are calculated correctly. The proposed personnel are reasonable for the work being performed; therefore, the specialist recommends these costs acceptable.

2. Fringe Benefits:

Total Negotiated Fringe Benefit Costs: Ex. 4	Not Applicable, the recipient did not propose Fringe Benefit costs: ☐

Specialist:
Does the Recipient have an approved rate agreement: ☐ Yes ☒ No

If No, select one of the following:
☒ Rate proposal was reviewed by the Cost/Price Analyst and found to be reasonable, allowable, and allocable (attach Cost/Price Analyst Determination)
☐ Rate Proposal was reviewed by the Cost/Price Analyst for a previous award (attach Cost/Price Analyst Determination)
List Date of review:
☐ Specialist determined that rate was reasonable
☐ Other:

Please fill out the following table with the negotiated costs:

	Base Subtotal	General Fringe (Ex.4%)	R&D Staff OH (Ex. 4%)	Fringe Totals	
R&D Staff	Redacted Exemption 4				
Non R&D Staff					

The fringe benefit costs in the negotiated budget were appropriately applied and are reasonable: ☒
See AWD-014 for details.

3. Travel:

Total Negotiated Travel Costs: $Ex. 4	Not Applicable, the recipient did not propose Travel costs: ☐
Project Officer: No changes to the travel section were made from the originally approved Budget Period 1 Submission.	
☒ Specialist concurs.	

4. Equipment:

Total Negotiated Equipment Costs: $Ex. 4	Not Applicable, the recipient did not propose Equipment costs: ☐

Project Officer:

Originally Approved BP1 Equipment: $0

Final Approved BP1 Equipment: $ Redacted Exemption 4

The type(s) of equipment proposed in the negotiated budget is/are reasonable for the scope of work: ☒

The cost of equipment proposed in the negotiated budget are reasonable: ☒

Is there any proposed equipment with a total cost exceeding $50,000: ☒ Yes ☐ No

Equipment	Total Cost	Purpose of Equipment	Basis of Cost
Redacted Exemption 4			

Each of the 2 pieces of equipment that Sapphire has included in their budget is a compilation of various components. Both the extraction unit and the pretreatment unit are essential components of the IABR process. The extraction unit will remove the lipids from the algal biomass and the pretreatment unit will remove a substantial portion of the water in the biomass. Both pieces of equipment and the associated costs are reasonable.

The purchase orders for the components for each of these pieces of equipment have been provided, and are located in AWD-007. The purchase orders did not include freight and shipping costs that have been included in the budget. As a result, the costs included in the budget are slightly higher than what is reflected on the purchase orders. Actual invoices have been submitted and paid that reflect these costs.

☒ Specialist concurs.

5. Supplies:

Total Negotiated Supplies Costs: $Ex. 4	Not Applicable, the recipient did not propose Supplies costs: ☐

Project Officer:

No changes to the supplies section were made from the originally approved Budget Period 1 submission.

☒ Specialist concurs.

6. Contractual:

Total Negotiated Contractual Costs: $ Ex. 4	Not Applicable, the recipient did not propose Contractual costs: ☐

Project Officer:

Originally Approved BP1 Contractual costs: $ Redacted Exemption 4

Final Approved BP1 Contractual costs: $

The subrecipients proposed in the negotiated budget are appropriate for the scope of work: ☒

The contractual costs proposed in the negotiated budget are reasonable: ☒ Yes

Please fill out the following table with the negotiated costs:

Subrecipient/Vendor Name	Original BP1 Cost	Revised BP1 Cost	Change in cost	Role in Project (Identify SOPO Tasks)
Redacted Exemption 4				

Did the Recipient propose any subrecipients with total costs above $100,000? ☐ Yes ☒ No

Subrecipients:

New Mexico State University (NMSU) is the only sub-recipient that was included in the originally approved Budget Period 1. The work that NMSU will be performing, which includes consulting and assisting with pond design research, as well as the associated $ Ex. 4 in funding, has been moved into Budget Period 2.

Vendors:

A number of changes have occurred in the revised contractual budget for Budget Period 1, as compared to the originally approved budget (Modification 002). The vendors highlighted in the table above in *italics* indicate those vendors whose costs have increased from the originally approved BP1 budget. The vendors highlighted in **bold** in the table above indicate those vendors whose costs have decreased from the originally approved BP1 budget. There are multiple entries for the same vendor to clearly breakout the various cost overruns that have occurred during Budget Period 1 and to align these cost overruns with how they affect the scope of the project. A justification for all of these changes (both increases and decreases) is provided here:

- ***Harris Group ($ Ex. 4):*** The work that the Harris group performed to complete the Class 25 design for the estimation and integration of the IABR was originally budgeted to cost $Ex. 4 . The $Ex. 4 that has been included in this revised budget reflects the actual costs that were incurred for this work. The slight overage of $Ex. 4 is reasonable considering the original budget was an estimate.
- **Brown and Caldwell ($ Ex. 4):** The work that Brown and Caldwell performed to complete the Class 25 design of the ponds and water systems was originally budgeted to cost $Ex. 4 . The $Ex. 4 that has been included in this budget reflects the actual costs that were incurred for this work. The reduction in costs of $Ex. 4 is reasonable considering the original budget was an estimate.
- **Geomatrix ($Ex. 4):** The work that Geomatrix performed to complete the balance of the NEPA permitting obligations was originally budgeted to cost $Ex. 4 The $Ex. 4 that has been included in this budget reflects the actual costs that were incurred for this work. The reduction in costs of $Ex. 4 is reasonable considering the

original budget was an estimate.

- *Geomatrix ($Ex. 4):* The work that Geomatrix performed to complete the site survey and terrain modeling work was originally budgeted to cost $Ex. 4 . The $Ex. 4 that has been included in this budget reflects the actual costs that were incurred for this work. The slight overage in costs of $Ex. 4 is reasonable considering the original budget was an estimate.
- **Geomatrix ($Ex. 4):** The work that Geomatrix performed to complete the geotechnical study and ground water permitting work was originally budgeted to cost $Ex. 4 . The $Ex. 4 that has been included in this budget reflects the actual costs that were incurred for this work. The significant decrease in costs of $Ex. 4 is

Redacted Exemption 4

- **Harris Group ($Ex. 4):** The work that the Harris group performed to complete the FEL-3 Engineering development for the IABR was originally budgeted to cost $Ex. 4 . The $Ex. 4 that has been included in this revised budget reflects the actual costs that were incurred for this work. The slight underage of $Ex. 4 is reasonable considering the original budget was based on an estimate.
- **Brown and Caldwell ($Ex. 4):** The work that Brown and Caldwell performed to complete the FEL-3 Engineering development for the IABR was originally budgeted to cost $Ex. 4 . The $Ex. 4 that has been included in this revised budget reflects the actual costs that were incurred for this work. This scope of work cost $Ex. 4 less than originally budgeted because the $Ex. 4 was an estimated place holder and budgeting tool to manage the project spending for this stage. The variance represents the change between the original budget estimate target and the actual.
- **Various ($Ex. 4):** The "various" vendors that have been included for Redacted Exemption 4 were lumped together into one group. These costs have been further broken down:
  - Harris Group ($Ex. 4): These costs covered the work that the Harris group was hired to perform with respect to Redacted Exemption 4
  -
  - Redacted Exemption 4
  -
  -
  -

- **Geomatrix ($Ex. 4):** The work that Geomatrix has performed with respect to the specific project permitting for the IABR was originally budgeted to cost $Ex. 4 . To date, they have completed a majority of this work, having spent $ Ex. 4 . In order to complete this work, Sapphire has budgeted an additional $Ex. 4 for a total of $Ex. 4 The significant decrease in costs of $Ex. 4 is due to the fact that the original $Ex. 4 was an estimate and the $Ex. 4 reflects what this work will actually cost.
- **Geomatrix ($Ex. 4):** The work that Geomatrix performed to complete the spring biological field survey and report was originally budgeted to cost $Ex. 4 . The $Ex. 4 that has been included in this budget reflects the actual costs that were incurred for this work. The slight reduction in costs of $Ex. 4 is reasonable considering the original budget was an estimate.
- *Harris Group ($Ex. 4):* The work that the Harris group has performed with respect to the 95% design completion for the IABR was originally budgeted to cost $Ex. 4 . To date, they have completed a majority of this work, having spent $ Ex. 4 . In order to complete this work, Sapphire has budgeted an additional $Ex. 4 for a total of $Ex. 4 .

Redacted Exemption 4

Based on these changes, the increased funding for this vendor is reasonable. All of the work orders that have been issued to support these changes have been provided and are located in AWD-007.

- ***Brown and Caldwell ($Ex. 4):*** The work that Brown and Caldwell have performed with respect to the 95% design completion for the IABR was originally budgeted to cost $Ex. 4 . To date, they have completed a majority of this work, having spent $Ex. 4 . In order to complete this work, Sapphire has budgeted an additional $Ex. 4 for a total of $Ex. 4 . The increased budget is

Redacted Exemption 4

Based on these changes, the increased funding for this vendor is reasonable. All of the work orders that have been issued to support these changes have been provided and are located in AWD-007.

- ***AMEC ($Ex. 4):*** The work that AMEC has performed with respect to the preconstruction and procurement management services were originally budgeted to cost $Ex. 4 . To date, they have completed a portion of this work, having spent $Ex. 4 . In order to complete this work, Sapphire has budgeted an additional $Ex. 4 for a total of $Ex. 4 . The increased budget is a reflection of the increased scope that AMEC is taking on during Budget Period 1. AMEC will be performing several other staging tasks that were originally planned to take place during Budget Period 2. As a result of these tasks being moved into Budget Period 1, the overall budget for these activities also increased. Based on these changes, the increased funding for this vendor is reasonable.
- ***AMEC ($Ex. 4):*** This scope of work was not included in the original Budget Period 1 scope of work. These "staging" related tasks include several construction-related activities that are being moved into Budget Period 1 from Budget Period 2. These include

Redacted Exemption 4

The limited notice to proceed, that Sapphire issued to AMEC has been provided, as well as the actual contract. Sapphire is aware that they are proceeding at risk as these activities have not yet been approved by the DOE. Both of these documents are located in AWD-007.

☒ Specialist concurs.

7. Construction:

Total Negotiated Construction Costs: $0	Not Applicable, the recipient did not propose Construction costs: ☒
Project Officer: No construction costs proposed.	
☒ Specialist concurs.	

8. Other Direct Costs:

Total Negotiated Other Direct Costs: $0	Not Applicable, the recipient did not propose Other Direct costs: ☒
Project Officer: No other direct costs proposed.	
☒ Specialist concurs.	

9. Indirect Charges:

Total Negotiated Indirect Costs: $Ex. 4	Not Applicable, the recipient did not propose Indirect Costs: ☐

Specialist:
Does the Recipient have an approved rate agreement: ☐ Yes ☒ No

If No, select one of the following:
☒ Rate proposal was reviewed by the Cost/Price Analyst and found to be reasonable, allowable, and allocable (attach Cost/Price Analyst Determination)
☐ Rate Proposal was reviewed by the Cost/Price Analyst for a previous award (attach Cost/Price Analyst Determination)
List Date of review:
☐ Specialist determined that rate was reasonable
☐ Other:

Base	Cost	Rate	Totals
R&D Staff OH	$ Redacted Exemption 4		
Total Direct	$		

The indirect costs proposed in the negotiated budget were appropriately applied and are reasonable: ☒
See AWD-014 for details.

10. Cost Share:

Project Officer:
Project is a: ☐ Research ☐ Development ☒ Demonstration ☐ Other: _____
The minimum recipient's cost share required for this award is: 20%
The recipient proposed cost share for this award is: Ex. 4
Does the proposed cost share meet the minimum requirement: ☒ Yes ☐ No

Specialist:
Is the proposed cost share: Redacted Exemption 4
Sapphire will be providing matching funds, $ Redacted Exemption 4

Third Party cost share commitment letters have been obtained: ☐

B. The following Project Officer and Specialist evaluation and negotiation commentary and recommendations address their agreement on all additional considerations for this award.

1. Please list any other special provisions agreed upon for inclusion in this award and describe the rationale for their inclusion below.

N/A

2. If a negotiation strategy, or strategies, is/are specified in the selection statement, provide a discussion below of how this was addressed and resolved.

25% of Total Project Costs must be kept aside from the project budget as contingency for the project. This contingency is applicable to total project costs and will be verified by the Project Officer as requested and discussed in the Contingency Appendix that is attached to the award. Contingency will be reported and tracked as well to address the 25% requirement per the Selection Statement.

3. Any other comments or concerns of the Project Officer and/or Specialist for this award, and the recommended approach to mitigating them, will be explained and addressed below.

N/A

4. Is this a Recovery Act award? ☒ Yes ☐ No
   - If Yes, does the Buy American Act apply (see applicability below)? ☒ Yes ☐ No
   - If Yes, does Davis Bacon Act apply (see applicability below)? ☒ Yes ☐ No

If the answer to either the Buy American Act or Davis Bacon Act questions is Yes, provide a short discussion below on: 1) the type of entity; 2) what applies; Davis Bacon, Buy American, or both; 3) whether it applies to the prime, subrecipient, or both; and 4) work to be performed that requires applicability of Buy American and/or Davis Bacon.

Sapphire Energy, Inc., their subrecipients, contractors, vendors, and other entities involved in this project will comply with Davis Bacon Act requirements where those requirements are applicable within the project.

SECTION IV – RECOMMENDATIONS/APPROVAL

Signatures of the Project Officer and Specialist, indicating their recommendations, as indicated below, will occur after their mutual agreement on the contents of this document, and before the review and approval process for the action. The signatures below indicate that the costs in the negotiated budget are reasonable, allowable, and allocable.

1. Technical Recommendation

The project costs are acceptable and should be considered for a financial assistance award. The resources have been reviewed relative to the Statement of Project Objectives and are found to be reasonable, except as previously noted herein.

Christy Sterner — Signature
8/26/11 — Date

Christy Sterner
Project Officer

2. Specialist Recommendation

In view of the above analysis, the technical evaluation, and considering all known factors, this Award is recommended.

Molly Hames — Signature
08/26/11 — Date

Molly Hames
Grants and Agreements Specialist

3. Contracting Officer Approval

☒ I concur with the above recommendation and have determined that the Recipient is responsible. I consider this Award to be in the best interest of the Government, and approve the award documents.

☐ In view of the analysis, the technical evaluation, and considering all known factors, I have determined that the Recipient is responsible. This Award is considered to be in the best interest of the Government and approved.

Melissa Wise — Signature
8/24/11 — Date

Melissa Wise
Contracting Officer

SPECIAL TERMS AND CONDITIONS

Table of Contents

1. RESOLUTION OF CONFLICTING CONDITIONS

Any apparent inconsistency between Federal statutes and regulations and the terms and conditions contained in this award must be referred to the DOE Award Administrator for guidance.

2. AWARD AGREEMENT TERMS AND CONDITIONS

This award/agreement consists of the Assistance Agreement, plus the following:

a. Special Terms and Conditions.
b. Attachments:

Attachment Number	Title
1.	Intellectual Property Provisions
2.	Statement of Project Objectives
3.	Federal Assistance Reporting Checklist and Instructions
4.	Budget Pages (SF 424A)
5.	Requirements for Contingency Funds for Integrated Biorefinery Projects

c. Applicable program regulations.
d. DOE Assistance Regulations, 10 CFR Part 600 at http://ecfr.gpoaccess.gov.
e. Application/proposal as approved by DOE.
f. National Policy Assurances to be incorporated as award terms in effect on date of award at http://management.energy.gov/business_doe/1374.htm.

3. ELECTRONIC AUTHORIZATION OF AWARD DOCUMENTS

Acknowledgement of award documents by the Recipient's authorized representative through electronic systems used by the Department of Energy, specifically FedConnect, constitutes the Recipient's acceptance of the terms and conditions of the award. Acknowledgement via FedConnect by the Recipient's authorized representative constitutes the Recipient's electronic signature.

4. AWARD PROJECT PERIOD AND BUDGET PERIODS

The Project Period for this award is 12/29/2009 through 09/30/2014, consisting of the following Budget Periods:

Budget Period	Start Date	End Date
1	12/29/2009	12/31/2011
2	01/01/2012	09/30/2014

5. PAYMENT PROCEDURES - REIMBURSEMENT THROUGH THE AUTOMATED CLEARING HOUSE (ACH) VENDER INQUIRY PAYMENT ELECTRONIC REPORTING SYSTEM (VIPERS)

a. Method of Payment. Payment will be made by reimbursement through ACH.

b. Requesting Reimbursement. Requests for reimbursements must be made electronically through Department of Energy's Oak Ridge Financial Service Center (ORFSC) VIPERS. To access and use VIPERS, you must enroll at https://finweb.oro.doe.gov/vipers.htm. Detailed instructions on how to enroll are provided on the web site.

For non-construction awards, you must submit a Standard Form (SF) 270, "Request for Advance or Reimbursement," at https://finweb.oro.doe.gov/vipers.htm and attach a file containing appropriate supporting documentation. The file attachment must show the total Federal share claimed on the SF 270, the non-Federal share claimed for the billing period if cost sharing is required, and cumulative expenditures to date (both Federal and non-Federal) for each of the following categories: salaries/wages and fringe benefits; equipment; travel; participant/training support costs, if any; other direct costs, including subawards/contracts; and indirect costs. For construction awards, you must submit a SF 271, "Outlay Report and Request for Reimbursement for Construction Programs," through VIPERS.

c. Timing of submittals. Submittal of the SF 270 or SF 271 should coincide with your normal billing pattern, but not more frequently than every two weeks. Requests for reimbursement must be limited to the amount of disbursements made during the billing period for the Federal share of direct project costs and the proportionate share of any allowable indirect costs incurred during that billing period.

d. Adjusting payment requests for available cash. You must disburse any funds that are available from repayments to and interest earned on a revolving fund, program income, rebates, refunds, contract settlements, audit recoveries, credits, discounts, and interest earned on any of those funds before requesting additional cash payments from DOE.

e. Payments. The DOE approving official will approve the invoice as soon as practical, but not later than 30 days after your request is received, unless the billing is improper. Upon receipt of an invoice payment authorization from the DOE approving official, the ORFSC will disburse payment to you. You may check the status of payments at the VIPER web site. All payments are made by electronic funds transfer to the bank account identified on the ACH Vendor/Miscellaneous Payment Enrollment Form (SF 3881) that you filed.

6. COST SHARING

a. Total Estimated Project Cost is the sum of the Federal Government share, including Federally Funded Research and Development Center (FFRDC) contractor costs, and Recipient share of the estimated project costs. The DOE FFRDC contractor cost is not included in the total approved budget for this award, because DOE will pay the DOE FFRDC contractor portion of the effort under an existing DOE contract. The Recipient is not responsible for reporting on that portion of the total estimated cost that is paid directly to the DOE FFRDC contractor.

The Recipient's cost share must come from non-Federal sources unless otherwise allowed by law. By accepting Federal funds under this award, you agree that you are liable for your percentage share of allowable project costs, on a budget period basis, even if the project is terminated early or is not funded to its completion. This cost is shared as follows:

Budget Period	DOE Cost Share, including FFRDC Costs		Recipient Cost Share $ / %	Total Estimated Costs
	DOE $ / %	FFRDC $ / %		
1	$9,970,000	$275,000 /	Redacted Exemption 4	
2	$39,480,000 Ex. 4	$0 / 0%		
Total Project	$49,450,000	$275,000 /		

b. If you discover that you may be unable to provide cost sharing of at least the amount identified in paragraph a of this Article, you should immediately provide written notification to the DOE Award Administrator, indicating whether you will continue the project or phase out the project. If you plan to continue the project, the notification must describe how replacement cost sharing will be secured.

c. You must maintain records of all project costs you claim as cost sharing, including in-kind costs, as well as records of costs to be paid by DOE. Such records are subject to audit.

d. Failure to provide the cost share required by this Article may result in the subsequent recovery by DOE of some or all the funds provided under the award.

7. REBUDGETING AND RECOVERY OF INDIRECT COSTS

a. If actual allowable indirect costs are less than those budgeted and funded under the award, you may use the difference to pay additional allowable direct costs during the project period. If at the completion of the award the Government's share of total allowable costs (i.e., direct and indirect), is less than the total costs reimbursed, you must refund the difference.

b. Recipients are expected to manage their indirect costs. DOE will not amend an award solely to provide additional funds for changes in indirect cost rates. DOE recognizes that the inability to obtain full reimbursement for indirect costs means the Recipient must absorb the underrecovery. Such underrecovery may be allocated as part of the organization's required cost sharing**.**

8. FINAL INCURRED COST AUDIT

In accordance with 10 CFR 600, DOE reserves the right to initiate a final incurred cost audit on this award. If the audit has not been performed or completed prior to the closeout of the award, DOE retains the right to recover an appropriate amount after fully considering the recommendations on disallowed costs resulting from the final audit.

9. STATEMENT OF FEDERAL STEWARDSHIP

DOE will exercise normal Federal stewardship in overseeing the project activities performed under this award. Stewardship activities include, but are not limited to, conducting site visits; reviewing performance and financial reports; providing technical assistance and/or temporary intervention in unusual circumstances to correct deficiencies which develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the award objectives have been accomplished.

10. STATEMENT OF SUBSTANTIAL INVOLVEMENT

1. Government Insight

   In order to adequately monitor project progress and provide technical direction and/or redirection to the Recipient, DOE must be provided an adequate level of insight into various Recipient activities. Government Insight activities by DOE include attendance at Recipient meetings, reviews and tests, as well as access for DOE's consultants to perform independent evaluations of Recipient's plans and processes. Recipient shall notify the DOE Project Officer of meetings, reviews, and tests in sufficient time to permit DOE participation, and provide all appropriate documentation for DOE review.

2. Specific activities to be conducted by DOE:

   a. Risk Evaluation – DOE will review the Recipient's initial Risk Mitigation Plan (RMP) for quality and completeness. DOE will also monitor updates to the RMP and actions taken by the Recipient during the performance of its award to mitigate risks and improve the probability of successful execution of the integrated Biorefinery project. At DOE's discretion, additional independent risk analyses of the project by DOE consultants may be requested.

b. Independent Engineering Assessments – DOE will engage a private, independent engineering (IE) firm to assist in assessing the progress of the project and provide timely and accurate reports to DOE. The Recipient will ensure that the IE has access to any and all relevant documentation sufficient to allow the IE to provide independent evaluations to DOE on the progress of the project. Such documentation includes but is not limited to the following:

- Drawings and specifications
- Construction and Execution plans
- Resource loaded schedules
- Design functions and requirements for the site final design review
- Risk management plans
- Value management and engineering studies and/or plans
- Acquisition strategies
- Project execution plans
- Project controls including earned value management systems
- Qualifications of the integrated project team.
- Financial strategy for funding the construction project
- Updated marketing and business plan
- Invoices submitted to DOE

DOE will evaluate the quality and completeness of information and documentation provided by the Recipient to DOE and its consultants in order to allow DOE to provide technical direction and/or redirection to the Recipient about how best to achieve the purposes of the award. Consultants to DOE may not provide technical direction and/or redirection to the Recipient.

11. SITE VISITS

DOE's authorized representatives have the right to make site visits at reasonable times to review project accomplishments and management control systems and to provide technical assistance, if required. You must provide, and must require your subawardees to provide, reasonable access to facilities, office space, resources, and assistance for the safety and convenience of the government representatives in the performance of their duties. All site visits and evaluations must be performed in a manner that does not unduly interfere with or delay the work.

12. REPORTING REQUIREMENTS

a. Requirements. The reporting requirements for this award are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to this award. Failure to comply with these reporting requirements is considered a material noncompliance with the terms of the award. Noncompliance may result in withholding of future payments, suspension or termination of the current award, and withholding of future awards. A willful failure to perform, a history of failure to perform, or unsatisfactory performance of this and/or other financial assistance awards, may also result in a debarment action to preclude future awards by Federal agencies.

b. Dissemination of scientific/technical reports. Scientific/technical reports submitted under this award will be disseminated on the Internet via the DOE Information Bridge (www.osti.gov/bridge), unless the report contains patentable material, protected data or SBIR/STTR data. Citations for journal articles produced under the award will appear on the DOE Energy Citations Database (www.osti.gov/energycitations).

c. Restrictions. Reports submitted to the DOE Information Bridge must not contain any Protected Personal Identifiable Information (PII), limited rights data (proprietary data), classified information, information subject to export control classification, or other information not subject to release.

13. PUBLICATIONS

a. You are encouraged to publish or otherwise make publicly available the results of the work conducted under the award.

b. An acknowledgment of DOE support and a disclaimer must appear in the publication of any material, whether copyrighted or not, based on or developed under this project, as follows:

> *Acknowledgment*: "This material is based upon work supported by the Department of Energy [National Nuclear Security Administration] [add name(s) of other agencies, if applicable] under Award Number(s) [enter the award number(s)]."
>
> *Disclaimer*: "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."

14. FEDERAL, STATE, AND MUNICIPAL REQUIREMENTS

You must obtain any required permits and comply with applicable federal, state, and municipal laws, codes, and regulations for work performed under this award.

15. INTELLECTUAL PROPERTY PROVISIONS AND CONTACT INFORMATION

a. The intellectual property provisions applicable to this award are provided as an attachment to this award or are referenced in the Agreement Cover Page.

b. Questions regarding intellectual property matters should be referred to the DOE Award Administrator identified and the Patent Counsel designated as the service provider for the DOE office that issued the award.

Patent Counsel for the Golden Field Office is Julia Moody, who may be reached at julia.moody@go.doe.gov or 303-275-4867.

16. NATIONAL SECURITY: CLASSIFIABLE RESULTS ORIGINATING UNDER AN AWARD

a. This award is intended for unclassified, publicly releasable research. You will not be granted access to classified information. DOE does not expect that the results of the research project will involve classified information. Under certain circumstances, however, a classification review of information originated under the award may be required. The Department may review research work generated under this award at any time to determine if it requires classification.

b. Executive Order 12958 (60 Fed. Reg. 19,825 (1995)) states that basic scientific research information not clearly related to the national security shall not be classified. Nevertheless, some information concerning (among other things) scientific, technological, or economic matters relating to national security or cryptology may require classification. If you originate information during the course of this award that you believe requires classification, you must promptly:

1. Notify the DOE Project Officer and the DOE Award Administrator;

2. Submit the information by registered mail directly to the Director, Office of Classification and Information Control, SO-10.2; U.S. Department of Energy; P.O. Box A; Germantown, MD 20875-0963, for classification review.

3. Restrict access to the information to the maximum extent possible until you are informed that the information is not classified, but no longer than 30 days after receipt by the Director, Office of Classification and Information Control

c. If you originate information concerning the production or utilization of special nuclear material (i.e., plutonium, uranium enriched in the isotope 233 or 235, and any other material so determined under section 51 of the Atomic Energy Act) or nuclear energy, you must:

   1. Notify the DOE Project Officer and the DOE Award Administrator;

   2. Submit the information by registered mail directly to the Director, Office of Classification and Information Control, SO-10.2; U.S. Department of Energy; P. O. Box A; Germantown, MD 20875-0963 for classification review within 180 days of the date the Recipient first discovers or first has reason to believe that the information is useful in such production or utilization; and

   3. Restrict access to the information to the maximum extent possible until you are informed that the information is not classified, but no longer than 90 days after receipt by the Director, Office of Classification and Information Control.

d. If DOE determines any of the information requires classification, you agree that the Government may terminate the award by mutual agreement in accordance with 10 CFR 600.25(d). All material deemed to be classified must be forwarded to DOE, in a manner specified by DOE.

e. If DOE does not respond within the specified time periods, you are under no further obligation to restrict access to the information.

17. CONTINUATION APPLICATION AND FUNDING

a. Continuation Application. A continuation application is a non-competitive application for an additional budget period within a previously approved project period. At least 60 days before the end of each budget period, your continuation application must be submitted to the DOE Project Officer and the DOE Award Administrator identified in the Assistance Agreement, to be eligible to receive a continuation award for the next budget period. The continuation application must include the following information:

   1. Application for Federal Assistance, SF-424.

   2. A continuation report, which must provide a summary of the progress towards meeting the objectives of the award, including any significant findings, conclusions, or developments, a comparison of actual accomplishment with the objectives established for the reporting period (milestones, deliverables, decision point criteria and stage gates), reasons for slippage if goals were not met, an estimate of any unobligated balances remaining at the end of the budget period, and when applicable an explanation of cost overruns or underruns. A description of your plans for the award during the upcoming budget period and any variance from the DOE approved objectives needs to be included in the continuation application package.

3. A detailed budget and supporting justification for the upcoming budget period with the supporting documentation below, including an estimate of DOE funds expected to be remaining at the end of the current budget period:

   a) Budget Information – Non Construction Programs, SF-424A.

   b) Cost Reasonableness Determination, PMC 123.1 (Excel Version).

4. Environmental Checklist, EF1, (This form should be completed on-line at https://www.eere-pmc.energy.gov/).

5. Commitment Letters from Third Parties Contributing to Cost Sharing, if applicable.

6. Statement of Project Objectives (SOPO), if revision is required.

b. Continuation Funding. Continuation funding is contingent on: (1) availability of funds; (2) meeting the objectives, milestones, deliverables, decision point criteria and stage gates of your award and obtaining approval from DOE to continue work on the project (DOE authorizing either Pass or Redirect through a stage-gate review); (3) submittal of required reports; or (4) compliance with the terms and conditions of the award.

18. LOBBYING RESTRICTIONS

By accepting funds under this award, you agree that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

19. NOTICE REGARDING THE PURCHASE OF AMERICAN-MADE EQUIPMENT AND PRODUCTS -- SENSE OF CONGRESS

It is the sense of the Congress that, to the greatest extent practicable, all equipment and products purchased with funds made available under this award should be American-made.

20. FUNDING OF BUDGET PERIODS

DOE has obligated $50,000,000 ($49,725,000 + $275,000 to FFRDC) for completion of the project authorized by this agreement; however, only $10,245,000 ($9,970,000 + $275,000 to FFRDC) is available for work performed by the Recipient during Budget Period 1 of the project. For Budget Period 2, the remainder or $39,755,000 will be available contingent upon the submission by the Recipient of a continuation application and written approval of the continuation application by the DOE Contracting Officer.

In the event that the Recipient does not submit a continuation application for subsequent Budget Periods, or DOE disapproves a continuation application for subsequent Budget Periods, the maximum DOE liability to the Recipient is the funds that are available for the current approved Budget Period. In such event, DOE reserves the right to deobligate any remaining funds.

21. PROPERTY

Real property and equipment acquired by the Recipient shall be subject to the rules set forth in 10 CFR 600.130-137, 10 CFR 600.231-233, or 10 CFR 600.320-324, as applicable.

Consistent with the goals and objectives of this project, the Recipient may continue to use Recipient acquired property beyond the Period of Performance, without obligation, during the period of such use, to extinguish DOE's conditional title to such property as described in 10 CFR 600.132-135, 10 CFR 600.231-233, or 600.321-324, subject to the following: (a) the Recipient continues to utilize such property for the objectives of the project as set forth in the Statement of Project Objectives; (b) DOE retains the right to periodically ask for, and the Recipient agrees to provide, reasonable information concerning the use and condition of the property; and (c) the Recipient follows the property disposition rules set forth in the applicable sections of 10 CFR Part 600, if the property is no longer used by the Recipient for the objectives of the project, and the fair market value of property exceeds $5,000.

Once the per unit fair market value of the property is less than $5,000, pursuant to the applicable sections of 10 CFR Part 600, DOE's residual interest in the property shall be extinguished and the Recipient shall have no further obligation to the DOE with respect to the property.

The regulations as set forth in 10 CFR Part 600 and the requirements of this article shall also apply to property in the possession of any team member, sub-recipient or other entity where such property was acquired in whole or in part with funds provided by DOE under this award or where such property was counted as cost-sharing under the award.

22. DECONTAMINATION AND/OR DECOMMISSIONING (D&D) COSTS

Notwithstanding any other provisions of this Agreement, the Government shall not be responsible for or have any obligation to the Recipient for (i) Decontamination and/or Decommissioning (D&D) of any of the Recipient's facilities, or (ii) any costs which may be incurred by the Recipient in connection with the D&D of any of its facilities due to the performance of the work under this Agreement, whether said work was performed prior to or subsequent to the effective date of the Agreement.

23. AT RISK FOR FINANCIAL CAPABILITY

You have been determined to be at risk for financial capability based on the Dun & Bradstreet (D&B) Business Information Report (BIR).

Based on this determination the following requirement has been incorporated into this award: Method of payment will be reimbursement through the Automated Clearing House (ACH) Vendor Inquiry Payment Electronic Reporting System (VIPERS).

You may report any change in circumstances that impact DOE's determination of your financial capability. If you feel that your circumstances have changed to this degree, you may request a re-evaluation at any time after 6 months from the initial determination. Please provide a written request and support to the DOE Award Administrator.

DOE will remove this provision by modification to the award if the conditions that prompted it have been corrected, as approved by the Contracting Officer.

24. INSOLVENCY, BANKRUPTCY OR RECEIVERSHIP

a. You shall immediately notify the DOE of the occurrence of any of the following events: (i) you or your parent's filing of a voluntary case seeking liquidation or reorganization under the Bankruptcy Act; (ii) your consent to the institution of an involuntary case under the Bankruptcy Act against you or your parent; (iii) the filing of any similar proceeding for or against you or your parent, or your consent to the dissolution, winding-up or readjustment of your debts, appointment of a receiver, conservator, trustee, or other officer with similar powers over you, under any other applicable state or federal law; or (iv) your insolvency due to its inability to pay debts generally as they become due.

b. Such notification shall be in writing and shall: (i) specifically set out the details of the occurrence of an event referenced in paragraph (a); (ii) provide the facts surrounding that event; and (iii) provide the impact such event will have on the project being funded by this award.

c. Upon the occurrence of any of the four events described in paragraph a. of this provision, DOE reserves the right to conduct a review of your award to determine your compliance with the required elements of the award (including such items as cost share, progress towards technical project objectives, and submission of required reports). If the DOE review determines that there are significant deficiencies or concerns with your performance under the award, DOE reserves the right to impose additional requirements, as needed, including (i) change of payment method; or (ii) institute payment controls.

d. Failure of the Recipient to comply with this provision may be considered a material noncompliance of this financial assistance award by the Contracting Officer.

25. CENTRAL CONTRACTOR REGISTRATION AND UNIVERSAL IDENTIFIER REQUIREMENTS

A. Requirement for Central Contractor Registration (CCR)

Unless you are exempted from this requirement under 2 CFR 25.110, you as the recipient must maintain the currency of your information in the CCR until you submit the final financial report required under this award or receive the final payment, whichever is later. This requires that you review and update the information at least annually after the initial registration, and more frequently if required by changes in your information or another award term.

B. Requirement for Data Universal Numbering System (DUNS) Numbers

If you are authorized to make subawards under this award, you:

1. Must notify potential subrecipients that no entity (see definition in paragraph C of this award term) may receive a subaward from you unless the entity has provided its DUNS number to you.

2. May not make a subaward to an entity unless the entity has provided its DUNS number to you.

C. Definitions

For purposes of this award term:

1. Central Contractor Registration (CCR) means the Federal repository into which an entity must provide information required for the conduct of business as a recipient. Additional information about registration procedures may be found at the CCR Internet site (currently at http://www.ccr.gov).

2. Data Universal Numbering System (DUNS) number means the nine-digit number established and assigned by Dun and Bradstreet, Inc. (D&B) to uniquely identify business entities. A DUNS number may be obtained from D&B by telephone (currently 866-705-5711) or the Internet (currently at http://fedgov.dnb.com/webform).

3. Entity, as it is used in this award term, means all of the following, as defined at 2 CFR Part 25, subpart C:

a. A Governmental organization, which is a State, local government, or Indian Tribe;

b. A foreign public entity;

c. A domestic or foreign nonprofit organization;

d. A domestic or foreign for-profit organization; and

e. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.

4. Subaward:

a. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.

b. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see Sec. __.210 of the attachment to OMB Circular A-133, Audits of States, Local Governments, and Non-Profit Organizations).

c. A subaward may be provided through any legal agreement, including an agreement that you consider a contract.

5. Subrecipient means an entity that:

a. Receives a subaward from you under this award; and

b. Is accountable to you for the use of the Federal funds provided by the subaward.

26. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) REQUIREMENTS

For this award, DOE has made a final NEPA determination for all activities under this award that are listed in the Statement of Project Objectives (SOPO) formally approved by DOE through incorporation into and attached to the award. You (Recipient) may proceed with the activities as described in the SOPO. This NEPA determination is specific to the project as described in the SOPO formally approved by DOE through incorporation into and attached to the award.

If you later add to or modify the activities in the above-referenced SOPO, you must submit the revised SOPO to the DOE Project Officer. Those additions or modifications are subject to review by the NEPA Compliance Officer and approval by the DOE's Contracting Officer. Recipients are restricted from taking any action using Federal funds, which would have an adverse effect on the environment or limit the choice of reasonable alternatives prior to DOE providing a final NEPA determination. Any new activities or modification of activities is subject to additional NEPA review and is not authorized for federal funding until DOE provides a NEPA determination on those additions or modifications. DOE may require the Recipient to submit additional information to support a revised NEPA determination. Should you move forward with activities that are not authorized for Federal funding by the DOE Contracting Officer in advance of the final NEPA determination, you are doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share.

Per the Finding of No Significant Impact (FONSI) you are required to:
1. Minimize the likelihood of adverse impacts to birds protected under the Migratory Bird Treaty Act by completing nesting bird surveys in areas to be disturbed. If nesting birds occupy the area to be disturbed, all ground disturbing activities should be avoided until nesting is complete.

2. Coordinate with USFWS and NMDFG in order to minimize potential impacts to any burrowing owls located on the site, if present, as outlined in the "Guidelines and Recommendations for Burrowing Owl Surveys and Mitigation" (July 2007)

Results of the nesting bird and burrowing owl surveys must be submitted to DOE for review and approval prior to DOE or cost share funds being applied to any ground disturbing activities.

27. INDEMNITY

The Recipient shall indemnify the Government and its officers, agents, or employees for any and all liability, including litigation expenses and attorneys' fees, arising from suits, actions, or claims of any character for death, bodily injury, or loss of or damage to property or to the environment, resulting from the project, except to the extent that such liability results from the direct fault or negligence of Government officers, agents or employees, or to the extent such liability may be covered by applicable allowable costs provisions.

28. SPECIAL PROVISIONS RELATING TO WORK FUNDED UNDER AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (May 2009)

Preamble

The American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, (Recovery Act) was enacted to preserve and create jobs and promote economic recovery, assist those most impacted by the recession, provide investments needed to increase economic efficiency by spurring technological advances in science and health, invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits, stabilize State and local government budgets, in order to minimize and avoid reductions in essential services and counterproductive State and local tax increases. Recipients shall use grant funds in a manner that maximizes job creation and economic benefit.

The Recipient shall comply with all terms and conditions in the Recovery Act relating generally to governance, accountability, transparency, data collection and resources as specified in Act itself and as discussed below.

Recipients should begin planning activities for their first tier subrecipients, including obtaining a DUNS number (or updating the existing DUNS record), and registering with the Central Contractor Registration (CCR).

Be advised that Recovery Act funds can be used in conjunction with other funding as necessary to complete projects, but tracking and reporting must be separate to meet the reporting requirements of the Recovery Act and related guidance. For projects funded by sources other than the Recovery Act, Contractors must keep separate records for Recovery Act funds and to ensure those records comply with the requirements of the Act.

The Government has not fully developed the implementing instructions of the Recovery Act, particularly concerning specific procedural requirements for the new reporting requirements. The Recipient will be provided these details as they become available. The Recipient must comply with all requirements of the Act. If the recipient believes there is any inconsistency between ARRA requirements and current award terms and conditions, the issues will be referred to the Contracting Officer for reconciliation.

Definitions

For purposes of this clause, Covered Funds means funds expended or obligated from appropriations under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5. Covered Funds will have special accounting codes and will be identified as Recovery Act funds in the grant, cooperative agreement or TIA and/or modification using Recovery Act funds. Covered Funds must be reimbursed by September 30, 2015.

Non-Federal employer means any employer with respect to covered funds -- the contractor, subcontractor, grantee, or recipient, as the case may be, if the contractor, subcontractor, grantee, or recipient is an employer; and any professional membership organization, certification of other professional body, any agent or licensee of the Federal government, or any person acting directly or indirectly in the interest of an employer receiving covered funds; or with respect to covered funds received by a State or local government, the State or local government receiving the funds and any contractor or subcontractor receiving the funds and any contractor or subcontractor of the State or local government; and does not mean any department, agency, or other entity of the federal government.

Recipient means any entity that receives Recovery Act funds directly from the Federal government (including Recovery Act funds received through grant, loan, or contract) other than an individual and includes a State that receives Recovery Act Funds.

Special Provisions

A. <u>Flow Down Requirement</u>

Recipients must include these special terms and conditions in any subaward.

B. Segregation of Costs

Recipients must segregate the obligations and expenditures related to funding under the Recovery Act. Financial and accounting systems should be revised as necessary to segregate, track and maintain these funds apart and separate from other revenue streams. No part of the funds from the Recovery Act shall be commingled with any other funds or used for a purpose other than that of making payments for costs allowable for Recovery Act projects.

C. Prohibition on Use of Funds

None of the funds provided under this agreement derived from the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, may be used by any State or local government, or any private entity, for any casino or other gambling establishment, aquarium, zoo, golf course, or swimming pool.

D. Access to Records

With respect to each financial assistance agreement awarded utilizing at least some of the funds appropriated or otherwise made available by the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, any representative of an appropriate inspector general appointed under section 3 or 8G of the Inspector General Act of 1988 (5 U.S.C. App.) or of the Comptroller General is authorized --

(1) to examine any records of the contractor or grantee, any of its subcontractors or subgrantees, or any State or local agency administering such contract that pertain to, and involve transactions that relate to, the subcontract, subcontract, grant, or subgrant; and

(2) to interview any officer or employee of the contractor, grantee, subgrantee, or agency regarding such transactions.

E. Publication

An application may contain technical data and other data, including trade secrets and/or privileged or confidential information, which the applicant does not want disclosed to the public or used by the Government for any purpose other than the application. To protect such data, the applicant should specifically identify each page including each line or paragraph thereof containing the data to be protected and mark the cover sheet of the application with the following Notice as well as referring to the Notice on each page to which the Notice applies:

Notice of Restriction on Disclosure and Use of Data
The data contained in pages ---- of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data here to the extent provided in the award. This restriction does not limit the Government's right to use or disclose data obtained without restriction from any source, including the applicant.

Information about this agreement will be published on the Internet and linked to the website www.recovery.gov, maintained by the Accountability and Transparency Board. The Board may exclude posting contractual or other information on the website on a case-by-case basis when necessary to protect national security or to protect information that is not subject to disclosure under sections 552 and 552a of title 5, United States Code.

F. Protecting State and Local Government and Contractor Whistleblowers.

The requirements of Section 1553 of the Act are summarized below. They include, but are not limited to:

Prohibition on Reprisals: An employee of any non-Federal employer receiving covered funds under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, may not be discharged, demoted, or otherwise discriminated against as a reprisal for disclosing, including a disclosure made in the ordinary course of an employee's duties, to the Accountability and Transparency Board, an inspector general, the Comptroller General, a member of Congress, a State or Federal regulatory or law enforcement agency, a person with supervisory authority over the employee (or other person working for the employer who has the authority to investigate, discover or terminate misconduct), a court or grant jury, the head of a Federal agency, or their representatives information that the employee believes is evidence of:

- gross management of an agency contract or grant relating to covered funds;
- a gross waste of covered funds;
- a substantial and specific danger to public health or safety related to the implementation or use of covered funds;
- an abuse of authority related to the implementation or use of covered funds; or
- as violation of law, rule, or regulation related to an agency contract (including the competition for or negotiation of a contract) or grant, awarded or issued relating to covered funds.

Agency Action: Not later than 30 days after receiving an inspector general report of an alleged reprisal, the head of the agency shall determine whether there is sufficient basis to conclude that the non-Federal employer has subjected the employee to a prohibited reprisal. The agency shall either issue an order denying relief in whole or in part or shall take one or more of the following actions:

- Order the employer to take affirmative action to abate the reprisal.
- Order the employer to reinstate the person to the position that the person held before the reprisal, together with compensation including back pay, compensatory damages, employment benefits, and other terms and conditions of employment that would apply to the person in that position if the reprisal had not been taken.
- Order the employer to pay the employee an amount equal to the aggregate amount of all costs and expenses (including attorneys' fees and expert witnesses' fees) that were reasonably incurred by the employee for or in connection with, bringing the complaint regarding the reprisal, as determined by the head of a court of competent jurisdiction.

Nonenforceablity of Certain Provisions Waiving Rights and remedies or Requiring Arbitration: Except as provided in a collective bargaining agreement, the rights and remedies provided to aggrieved employees by this section may not be waived by any agreement, policy, form, or condition of employment, including any predispute arbitration agreement. No predispute arbitration agreement shall be valid or enforceable if it requires arbitration of a dispute arising out of this section.

Requirement to Post Notice of Rights and Remedies: Any employer receiving covered funds under the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, shall post notice of the rights and remedies as required therein. (Refer to section 1553 of the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5, www.Recovery.gov, for specific requirements of this section and prescribed language for the notices.).

G. Request for Reimbursement

RESERVED

H. False Claims Act

Recipient and sub-recipients shall promptly refer to the DOE or other appropriate Inspector General any credible evidence that a principal, employee, agent, contractor, sub-grantee, subcontractor or other person has submitted a false claim under the False Claims Act or has committed a criminal or civil violation of laws pertaining to fraud, conflict of interest, bribery, gratuity or similar misconduct involving those funds.

I. Information in Support of Recovery Act Reporting

Recipient may be required to submit backup documentation for expenditures of funds under the Recovery Act including such items as timecards and invoices. Recipient shall provide copies of backup documentation at the request of the Contracting Officer or designee.

J. Availability of Funds

Funds appropriated under the Recovery Act and obligated to this award are available for reimbursement of costs until September 30, 2015.

29. REPORTING AND REGISTRATION REQUIREMENTS UNDER SECTION 1512 OF THE RECOVERY ACT

(a) This award requires the recipient to complete projects or activities which are funded under the American Recovery and Reinvestment Act of 2009 (Recovery Act) and to report on use of Recovery Act funds provided through this award. Information from these reports will be made available to the public.

(b) The reports are due no later than ten calendar days after each calendar quarter in which the Recipient receives the assistance award funded in whole or in part by the Recovery Act.

(c) Recipients and their first-tier subrecipients must maintain current registrations in the Central Contractor Registration (*http://www.ccr.gov*) at all times during which they have active federal awards funded with Recovery Act funds. A Dun and Bradstreet Data Universal Numbering System (DUNS) Number (*http://www.dnb.com*) is one of the requirements for registration in the Central Contractor Registration.

(d) The recipient shall report the information described in section 1512(c) of the Recovery Act using the reporting instructions and data elements that will be provided online at *http://www.FederalReporting.gov* and ensure that any information that is pre-filled is corrected or updated as needed.

30. REQUIRED USE OF AMERICAN IRON, STEEL, AND MANUFACTURED GOODS – SECTION 1605 OF THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009

If the Recipient determines at any time that any construction, alteration, or repair activity on a public building or public works will be performed during the course of the project, the Recipient shall notify the Contracting Officer prior to commencing such work and the following provisions shall apply.

(a) *Definitions.* As used in this award term and condition—

(1) *Manufactured good* means a good brought to the construction site for incorporation into the building or work that has been—

(i) Processed into a specific form and shape; or

(ii) Combined with other raw material to create a material that has different properties than the properties of the individual raw materials.

(2) *Public building and public work* means a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.

(3) *Steel* means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

(b) *Domestic preference.* (1) This award term and condition implements Section 1605 of the American Recovery and Reinvestment Act of 2009 (Recovery Act) (Pub. L. 111–5), by requiring that all iron, steel, and manufactured goods used in the project are produced in the United States except as provided in paragraph (b)(3) of this section and condition.

(2) This requirement does not apply to the material listed by the Federal Government as follows:

None

(3) The award official may add other iron, steel, and/or manufactured goods to the list in paragraph (b)(2) of this section and condition if the Federal Government determines that—

(i) The cost of the domestic iron, steel, and/or manufactured goods would be unreasonable. The cost of domestic iron, steel, or manufactured goods used in the project is unreasonable when the cumulative cost of such material will increase the cost of the overall project by more than 25 percent;

(ii) The iron, steel, and/or manufactured good is not produced, or manufactured in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(iii) The application of the restriction of section 1605 of the Recovery Act would be inconsistent with the public interest.

(c) *Request for determination of inapplicability of Section 1605 of the Recovery Act* . (1)(i) Any recipient request to use foreign iron, steel, and/or manufactured goods in accordance with paragraph (b)(3) of this section shall include adequate information for Federal Government evaluation of the request, including—

(A) A description of the foreign and domestic iron, steel, and/or manufactured goods;

(B) Unit of measure;

(C) Quantity;

(D) Cost;

(E) Time of delivery or availability;

(F) Location of the project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign iron, steel, and/or manufactured goods cited in accordance with paragraph (b)(3) of this section.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed cost comparison table in the format in paragraph (d) of this section.

(iii) The cost of iron, steel, and/or manufactured goods material shall include all delivery costs to the construction site and any applicable duty.

(iv) Any recipient request for a determination submitted after Recovery Act funds have been obligated for a project for construction, alteration, maintenance, or repair shall explain why the recipient could not reasonably foresee the need for such determination and could not have requested the determination before the funds were obligated. If the recipient does not submit a satisfactory explanation, the award official need not make a determination.

(2) If the Federal Government determines after funds have been obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official will amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is the unreasonable cost of the domestic iron, steel, or manufactured goods, the award official shall adjust the award amount or redistribute budgeted funds by at least the differential established in 2 CFR 176.110(a).

(3) Unless the Federal Government determines that an exception to section 1605 of the Recovery Act applies, use of foreign iron, steel, and/or manufactured goods is noncompliant with section 1605 of the American Recovery and Reinvestment Act.

(d) *Data.* To permit evaluation of requests under paragraph (b) of this section based on unreasonable cost, the Recipient shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Items Cost Comparison

Description	Unit of measure	Quantity	Cost (dollars)*
Item 1:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____
Item 2:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____

List name, address, telephone number, email address, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.

Include other applicable supporting information.

*Include all delivery costs to the construction site.

31. REQUIRED USE OF AMERICAN IRON, STEEL, AND MANUFACTURED GOODS (COVERED UNDER INTERNATIONAL AGREEMENTS) – SECTION 1605 OF THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009

(a) *Definitions.* As used in this award term and condition—

Designated country — (1) A World Trade Organization Government Procurement Agreement country (Aruba, Austria, Belgium, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea (Republic of), Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and United Kingdom;

(2) A Free Trade Agreement (FTA) country (Australia, Bahrain, Canada, Chile, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Mexico, Morocco, Nicaragua, Oman, Peru, or Singapore); or

(3) A United States-European Communities Exchange of Letters (May 15, 1995) country: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and United Kingdom.

Designated country iron, steel, and/or manufactured goods — (1) Is wholly the growth, product, or manufacture of a designated country; or

(2) In the case of a manufactured good that consist in whole or in part of materials from another country, has been substantially transformed in a designated country into a new and different manufactured good distinct from the materials from which it was transformed.

Domestic iron, steel, and/or manufactured good — (1) Is wholly the growth, product, or manufacture of the United States; or

(2) In the case of a manufactured good that consists in whole or in part of materials from another country, has been substantially transformed in the United States into a new and different manufactured good distinct from the materials from which it was transformed. There is no requirement with regard to the origin of components or subcomponents in manufactured goods or products, as long as the manufacture of the goods occurs in the United States.

Foreign iron, steel, and/or manufactured good means iron, steel and/or manufactured good that is not domestic or designated country iron, steel, and/or manufactured good.

Manufactured good means a good brought to the construction site for incorporation into the building or work that has been—

(1) Processed into a specific form and shape; or

(2) Combined with other raw material to create a material that has different properties than the properties of the individual raw materials.

Public building and *public work* means a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

(b) *Iron, steel, and manufactured goods.* (1) The award term and condition described in this section implements—

(i) Section 1605(a) of the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5) (Recovery Act), by requiring that all iron, steel, and manufactured goods used in the project are produced in the United States; and

(ii) Section 1605(d), which requires application of the Buy American requirement in a manner consistent with U.S. obligations under international agreements. The restrictions of section 1605 of the Recovery Act do not apply to designated country iron, steel, and/or manufactured goods. The Buy American requirement in section 1605 shall not be applied where the iron, steel or manufactured goods used in the project are from a Party to an international agreement that obligates the recipient to treat the goods and services of that Party the same as domestic goods and services. This obligation shall only apply to projects with an estimated value of $7,443,000 or more.

(2) The recipient shall use only domestic or designated country iron, steel, and manufactured goods in performing the work funded in whole or part with this award, except as provided in paragraphs (b)(3) and (b)(4) of this section.

(3) The requirement in paragraph (b)(2) of this section does not apply to the iron, steel, and manufactured goods listed by the Federal Government as follows:

None

(4) The award official may add other iron, steel, and manufactured goods to the list in paragraph (b)(3) of this section if the Federal Government determines that—

(i) The cost of domestic iron, steel, and/or manufactured goods would be unreasonable. The cost of domestic iron, steel, and/or manufactured goods used in the project is unreasonable when the cumulative cost of such material will increase the overall cost of the project by more than 25 percent;

(ii) The iron, steel, and/or manufactured good is not produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality; or

(iii) The application of the restriction of section 1605 of the Recovery Act would be inconsistent with the public interest.

(c) *Request for determination of inapplicability of section 1605 of the Recovery Act or the Buy American Act.* (1)(i) Any recipient request to use foreign iron, steel, and/or manufactured goods in accordance with paragraph (b)(4) of this section shall include adequate information for Federal Government evaluation of the request, including—

(A) A description of the foreign and domestic iron, steel, and/or manufactured goods;

(B) Unit of measure;

(C) Quantity;

(D) Cost;

(E) Time of delivery or availability;

(F) Location of the project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign iron, steel, and/or manufactured goods cited in accordance with paragraph (b)(4) of this section.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed cost comparison table in the format in paragraph (d) of this section.

(iii) The cost of iron, steel, or manufactured goods shall include all delivery costs to the construction site and any applicable duty.

(iv) Any recipient request for a determination submitted after Recovery Act funds have been obligated for a project for construction, alteration, maintenance, or repair shall explain why the recipient could not reasonably foresee the need for such determination and could not have requested the determination before the funds were obligated. If the recipient does not submit a satisfactory explanation, the award official need not make a determination.

(2) If the Federal Government determines after funds have been obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official will amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other appropriate actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is the unreasonable cost of the domestic iron, steel, or manufactured goods, the award official shall adjust the award amount or redistribute budgeted funds, as appropriate, by at least the differential established in 2 CFR 176.110(a).

(3) Unless the Federal Government determines that an exception to section 1605 of the Recovery Act applies, use of foreign iron, steel, and/or manufactured goods other than designated country iron, steel, and/or manufactured goods is noncompliant with the applicable Act.

(d) *Data.* To permit evaluation of requests under paragraph (b) of this section based on unreasonable cost, the applicant shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Items Cost Comparison

Description	Unit of measure	Quantity	Cost (dollars)*
Item 1:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____
Item 2:			
Foreign steel, iron, or manufactured good	_____	_____	_____
Domestic steel, iron, or manufactured good	_____	_____	_____

List name, address, telephone number, email address, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.

Include other applicable supporting information.

*Include all delivery costs to the construction site.

32. RECOVERY ACT TRANSACTIONS LISTED IN SCHEDULE OF EXPENDITURES OF FEDERAL AWARDS AND RECIPIENT RESPONSIBILITIES FOR INFORMING SUBRECIPIENTS

(a) To maximize the transparency and accountability of funds authorized under the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5) (Recovery Act) as required by Congress and in accordance with 2 CFR 215.21 "Uniform Administrative Requirements for Grants and Agreements" and OMB Circular A–102 Common Rules provisions, recipients agree to maintain records that identify adequately the source and application of Recovery Act funds. OMB Circular A–102 is available at *http://www.whitehouse.gov/omb/circulars/a102/a102.html.*

(b) For recipients covered by the Single Audit Act Amendments of 1996 and OMB Circular A–133, "Audits of States, Local Governments, and Non-Profit Organizations," recipients agree to separately identify the expenditures for Federal awards under the Recovery Act on the Schedule of Expenditures of Federal Awards (SEFA) and the Data Collection Form (SF–SAC) required by OMB Circular A–133. OMB Circular A–133 is available at *http://www.whitehouse.gov/omb/circulars/a133/a133.html.* This shall be accomplished by identifying expenditures for Federal awards made under the Recovery Act separately on the SEFA, and as separate rows under Item 9 of Part III on the SF–SAC by CFDA number, and inclusion of the prefix "ARRA-" in identifying the name of the Federal program on the SEFA and as the first characters in Item 9d of Part III on the SF–SAC.

(c) Recipients agree to separately identify to each subrecipient, and document at the time of subaward and at the time of disbursement of funds, the Federal award number, CFDA number, and amount of Recovery Act funds. When a recipient awards Recovery Act funds for an existing program, the information furnished to subrecipients shall distinguish the subawards of incremental Recovery Act funds from regular subawards under the existing program.

(d) Recipients agree to require their subrecipients to include on their SEFA information to specifically identify Recovery Act funding similar to the requirements for the recipient SEFA described above. This information is needed to allow the recipient to properly monitor subrecipient expenditure of ARRA funds as well as oversight by the Federal awarding agencies, Offices of Inspector General and the Government Accountability Office.

33. WAGE RATE REQUIREMENTS UNDER SECTION 1606 OF THE RECOVERY ACT

(a) Section 1606 of the Recovery Act requires that all laborers and mechanics employed by contractors and subcontractors on projects funded directly by or assisted in whole or in part by and through the Federal Government pursuant to the Recovery Act shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code.

Pursuant to Reorganization Plan No. 14 and the Copeland Act, 40 U.S.C. 3145, the Department of Labor has issued regulations at 29 CFR parts 1, 3, and 5 to implement the Davis-Bacon and related Acts. Regulations in 29 CFR 5.5 instruct agencies concerning application of the standard Davis-Bacon contract clauses set forth in that section. Federal agencies providing grants, cooperative agreements, and loans under the Recovery Act shall ensure that the standard Davis-Bacon contract clauses found in 29 CFR 5.5(a) are incorporated in any resultant covered contracts that are in excess of $2,000 for construction, alteration or repair (including painting and decorating).

(b) For additional guidance on the wage rate requirements of section 1606, contact your awarding agency. Recipients of grants, cooperative agreements and loans should direct their initial inquiries concerning the application of Davis-Bacon requirements to a particular federally assisted project to the Federal agency funding the project. The Secretary of Labor retains final coverage authority under Reorganization Plan Number 14.

34. DAVIS BACON ACT AND CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

If the Recipient determines at any time that any construction, alteration, or repair activity as defined by 29 CFR 5.2(j) (http://cfr.vlex.com/vid/5-2-definitions-19681309) will be performed during the course of the project, the Recipient shall notify the Contracting Officer prior to commencing such work and the following provisions shall apply. A modification to the award which incorporates the appropriate Davis-Bacon wage rate determination(s) will constitute the Contracting Officer's approval to proceed.

Definitions: For purposes of this provision, “Davis Bacon Act and Contract Work Hours and Safety Standards Act,” the following definitions are applicable:

(1) “Award” means any grant, cooperative agreement or technology investment agreement made with Recovery Act funds by the Department of Energy (DOE) to a Recipient. Such Award must require compliance with the labor standards clauses and wage rate requirements of the Davis-Bacon Act (DBA) for work performed by all laborers and mechanics employed by Recipients (other than a unit of State or local government whose own employees perform the construction) Subrecipients, Contractors, and subcontractors.

(2) “Contractor” means an entity that enters into a Contract. For purposes of these clauses, Contractor shall include (as applicable) prime contractors, Recipients, Subrecipients, and Recipients’ or Subrecipients’ contractors, subcontractors, and lower-tier subcontractors. “Contractor” does not mean a unit of State or local government where construction is performed by its own employees.”

(3) “Contract” means a contract executed by a Recipient, Subrecipient, prime contractor, or any tier subcontractor for construction, alteration, or repair. It may also mean (as applicable) (i) financial assistance instruments such as grants, cooperative agreements, technology investment agreements, and loans; and, (ii) Sub awards, contracts and subcontracts issued under financial assistance agreements. “Contract” does not mean a financial assistance instrument with a unit of State or local government where construction is performed by its own employees.

(4) “Contracting Officer” means the DOE official authorized to execute an Award on behalf of DOE and who is responsible for the business management and non-program aspects of the financial assistance process.

(5) “Recipient” means any entity other than an individual that receives an Award of Federal funds in the form of a grant, cooperative agreement, or technology investment agreement directly from the Federal Government and is financially accountable for the use of any DOE funds or property, and is legally responsible for carrying out the terms and conditions of the program and Award.

(6) “Subaward” means an award of financial assistance in the form of money, or property in lieu of money, made under an award by a Recipient to an eligible Subrecipient or by a Subrecipient to a lower-tier subrecipient. The term includes financial assistance when provided by any legal agreement, even if the agreement is called a contract, but does not include the Recipient’s procurement of goods and services to carry out the program nor does it include any form of assistance which is excluded from the definition of “Award” above.

(7) “Subrecipient” means a non-Federal entity that expends Federal funds received from a Recipient to carry out a Federal program, but does not include an individual that is a beneficiary of such a program.

(a) Davis Bacon Act

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and, without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, *provided* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The Contracting Officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the Contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *provided* that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The Department of Energy or the Recipient or Subrecipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the Contract, the Department of Energy, Recipient, or Subrecipient, may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause

the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii) (A) The Contractor shall submit weekly for each week in which any Contract work is performed a copy of all payrolls to the Department of Energy if the agency is a party to the Contract, but if the agency is not such a party, the Contractor will submit the payrolls to the Recipient or Subrecipient (as applicable), applicant, sponsor, or owner, as the case may be, for transmission to the Department of Energy. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime Contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Department of Energy if the agency is a

party to the Contract, but if the agency is not such a party, the Contractor will submit them to the Recipient or Subrecipient (as applicable), applicant, sponsor, or owner, as the case may be, for transmission to the Department of Energy, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the Recipient or Subrecipient (as applicable), applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 3729 of title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Department of Energy or the

Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees—

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize

apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this Contract.

(6) Contracts and Subcontracts. The Recipient, Subrecipient, the Recipient’s, and Subrecipient’s contractors and subcontractor shall insert in any Contracts the clauses contained herein in(a)(1) through (10) and such other clauses as the Department of Energy may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Recipient shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of the paragraphs in this clause.

(7) Contract termination: debarment. A breach of the Contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this Contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Recipient, Subrecipient, the Contractor (or any of its subcontractors), and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No Contractor or subcontractor contracting for any part of the Contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such

territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The Department of Energy or the Recipient or Subrecipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Contracts and Subcontracts. The Recipient, Subrecipient, and Recipient's and Subrecipient's contractor or subcontractor shall insert in any Contracts, the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The Recipient shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(5) The Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the Contract for all laborers and mechanics, including guards and watchmen, working on the Contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. The records to be maintained under this paragraph shall be made available by the Contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Department of Energy and the Department of Labor, and the Contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

(c) Recipient Responsibilities for Davis Bacon Act

(1) On behalf of the Department of Energy (DOE), Recipient shall perform the following functions:

(i) Obtain, maintain, and monitor all Davis Bacon Act (DBA) certified payroll records submitted by the Subrecipients and Contractors at any tier under this Award;

(ii) Review all DBA certified payroll records for compliance with DBA requirements, including applicable DOL wage determinations;

(iii) Notify DOE of any non-compliance with DBA requirements by Subrecipients or Contractors at any tier, including any non-compliances identified as the result of reviews performed pursuant to paragraph (ii) above;

(iv) Address any Subrecipient and any Contractor DBA non-compliance issues; if DBA non-compliance issues cannot be resolved in a timely manner, forward complaints, summary of investigations and all relevant information to DOE;

(v) Provide DOE with detailed information regarding the resolution of any DBA non-compliance issues;

(vi) Perform services in support of DOE investigations of complaints filed regarding noncompliance by Subrecipients and Contractors with DBA requirements;

(vii) Perform audit services as necessary to ensure compliance by Subrecipients and Contractors with DBA requirements and as requested by the Contracting Officer; and

(viii) Provide copies of all records upon request by DOE or DOL in a timely manner.

(d) Rates of Wages

The minimum wages to be paid laborers and mechanics under this award involved in performance of work at the project site, as determined by the Secretary of Labor to be prevailing for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the pertinent locality, are found at http://www.wdol.gov/, by clicking on "Selecting DBA WDs". The Wage Determination Number(s) and General Decision Number(s) specific to this award are found below. These wage rates are minimum rates and are not intended to represent the actual wage rates that the Contractor may have to pay.

CONSTRUCTION TYPE	WAGE DETERMINATION NUMBER	GENERAL DECISION NUMBER
Building; Heavy	NM1	NM100001 04/09/2010 NM1

35. CONTINGENCY

(a) Contingency Requirement. A minimum amount of Contingency is required for awards selected under Funding Opportunity Announcement DE-FOA-0000096. "Contingency" is defined in the Appendix as: "a provision in the Project Management Plan to mitigate cost and/or schedule risk." Contingency funds must be (a) liquid, (b) immediately available, and (c) unrestricted funds dedicated exclusively to the Project for the purpose of mitigating project performance baseline risk. Contingency funds may come from a variety of sources, as approved by the Contracting Officer on a case-by-case basis in accordance with the Appendix to these Terms and Conditions (Attachment 5).

(b) Minimum Amount of Contingency. Initial Contingency funds shall be not less than 25 percent of the Total Project Cost that begins with Budget Period 2, as more specifically described in Section B(2) of the Appendix to these Special Terms and Conditions (Attachment 5).

(c) Contingency Not Counted Toward Cost Share or DOE Reimbursement. Contingency is in addition to the Total Project Cost and cannot count toward cost share or result in reimbursement by DOE above the share approved in the award.

(d) Appendix. All of the terms and conditions set forth in this provision shall be further subject to the requirements and clarifications of Attachment 5.

Extraction Development	$Redacted Exemption 4
Redacted Exemption 4	
PDU Equipment	Redacted Ex.4
Redacted Exemption 4	

Extraction Development
Purchase Orders

Sapphire Energy

Harris Group Inc.

September 20, 2010

Mr. Jaime Moreno
Sapphire Energy, Inc.
27101 Puerta Real, Suite 280
Mission Viejo, CA 92691

Sent via email to: jaime.moreno@sapphirefuel.com

Reference: **Sapphire Energy, Inc.**
Redacted Exemption 4
Engineering Change Request No. 10
Harris Group Project No. 42095.02
Sapphire Energy Project No. DV.100005.100

Dear Jaime:

As of last Friday, we had spent $

Redacted Exemption 4

Work completed to date includes most of the items detailed in our proposal of April 2, 2010. Vendor support is taking longer than anticipated, due to the extended delivery schedule. We also undertook the

Redacted Exemption 4

We reviewed the work remaining prior to commissioning the PDU with Redacted Exemption 4 during his visit to Seattle last week and agreed on the following list:

-
- Redacted Exemption 4
-
-
-
-
-

Communications:
P.O. Box 3855
Seattle, WA 98124-3855
(206) 494-9400
Fax (206) 494-9500
www.harrisgroup.com

Office:
Suite 200
200 W Thomas St.
Seattle, WA
98119

- Redacted Exemption 4

Looking forward to commissioning and initial operations, Harris Group remains available to assist. Many of our staff, including Paul Schoen, Bryan Olthof, and myself, have direct experience operating pilot equipment such as the PDU.

As we discussed with Redacted Ex.4 some of these tasks remain only vaguely defined, and Ex. 4 is not yet in position to provide clear direction on how shared tasks might be divided between Sapphire and Harris Group. We are therefore requesting an interim authorization of $ Redacted Exemption 4 . The additional authorization will cover time for Paul Schoen, with support from other Harris Group staff, to continue working on PDU development through the end of October. At that time, or whenever Harris Group's additional scope may be better defined, we can provide you with a more detailed proposal.

Harris Group proposes to perform this work in accordance with our existing agreement (proposal PS069.00-02, as revised January 23, 2009), with the scope and total authorization revised as outlined above. All other terms, including the Memorandum of Engagement, incorporated herein by reference, remain unchanged. Upon your decision to proceed, please sign the acceptance of the above terms on the following page and email a scanned copy back to us.

It is our pleasure to work with Sapphire Energy in developing its algae-to-fuels technology. We appreciate your continued confidence in Harris Group.

Very truly yours,

Douglas J. Dudgeon, Ph.D.
Director of Process Development

DJD/mmw

cc: Dave Marsh, Mark Warner, File 42095.02.1106

Approved and Accepted by:

Sapphire Energy, Inc.

Jaime E. Moreno — December 2, 2010

Signature — Date

Jaime E. Moreno, Vice President

Name, Title (Print or Type)

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: **1000600**
Date: 26 March 2010

VENDOR Redacted Exemption 4

SHIP TO **Richard Cranford**
Sapphire Energy, Inc.
3115 Merryfield Row
San Diego, CA 92121
Richard.cranford@sapphireenergy.com
858-768-4728

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
Redacted Exemption 4				

1. Please send two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Nick C. Herrera
   3115 Merryfield Row
   San Diego, CA 92121
   Phone 858-768-4708 Fax 888-501-8353

Authorized by 03/26/10 *Date*

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number:1001623-R1
Date: 16 December 2010

VENDOR Redacted Exemption 4

SHIP TO **Richard Cranford**
Sapphire Energy, Inc.
3115 Merryfield Row
San Diego, CA 92121
858-768-4728
Richard.cranford@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
		Redacted Exemption 4		

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number:1001623-R1
Date: 16 December 2010

VENDOR Redacted Exemption 4

SHIP TO
Richard Cranford
Sapphire Energy, Inc.
3115 Merryfield Row
San Diego, CA 92121
858-768-4728
Richard.cranford@sapphireenergy.com

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. **Send all correspondence to:**
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

12/16/2010

Authorized by *Date*

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Redacted Exemption 4

Redacted Exemption 4

Date December 7, 2010

Contact	Richard Cranford
Phone	858-768-4728
email	Richard.Cranford@sapphireenergy.com
Company	Sapphire Energy

Description of Job

UPDATED QUOTE: Sapphire Energy has requested

Redacted Exemption 4

Breakdown of Costs

Item	Task	Description of Service	Quantity	Unit	Rate	Est. Cost

Redacted Exemption 4

Please reference this quote (Redacted Ex. 4) on the Purchase Order and all shipments. Upon receipt of an updated quote, an invoice for $1000 will be submitted, Terms Net 30. The balance will be invoiced upon submission of a test report.

Redacted Exemption 4

Quote is valid for 30 days.

PLEASE REFERENCE THE ABOVE Ex.4QUOTE NUMBER IN THE PURCHASE ORDER.
STANDARD TERMS & CONDITIONS ARE ATTACHED.

We appreciate the opportunity to provide service to your corrosion and materials needs, as your business is important to us. As a "Demand Service" customer [Customer], it is important that you are aware of Ex.4 policy for Demand Service.

Please take the time to review the following Terms and Conditions for Demand Service.

TERMS AND CONDITIONS

1. A valid purchase order, in advance, is required for all service. Please reference the Ex.4 REF # on the Purchase order.

2. Service rates are per the current published Price List.

3. The payment term for service for customers who have secured credit is Net 30 days from date of invoice. No discounts are offered. If payment for services and expenses are not received within 30 days, interest will be added at the rate of 1.5% per month from said 30th day. In addition, without liability, services will be suspended until full amounts due for services, expenses and other related charges have been received.

4. For new Customers, we require a satisfactory Dun and Bradstreet (D&B) rating to open an account and we require 50% payment prior to the release of results. The terms for the remaining balance are Net 30. If a satisfactory D&B rating is not available, we require a 50% payment prior to the initiation of work and the balance due before results are released.

5. For delinquent Customers, we require 50% payment prior to the initiation of work and the balance due before the results are released.

6. For quotations in excess of $2,500, we require 50% payment prior to the release of results and the remaining balance is Net 30.

7. For International Customers we require payment in full prior to initiation of work. Funds are to be in US Dollars. Wired funds require a US $20 Administration fee.

8. Ex.4 business hours are 8:00AM to 5:00PM, Monday through Friday. Off-Hour Service will be provided and charged at 1.5X current rates.

9. The standard of care for all services performed or furnished byEx.4 will be the normal care and skill ordinarily used by members of the subject profession practicing under similar circumstances at the same rate and in the same locality.

10. Ex.4 agrees to provide a high standard of professional service and will exert its best efforts within the time and funds available for the Work. However, the results of the Work will be advisory and/or experimenta in nature. Therefore, in no event shall Ex.4 its employees and agents have any obligation or liability for damages, including, but not limited to consequential damages, arising out of or in connection with the Customer's use or inability to use the information, apparatus, method or process resulting from this Work.

11. Ex.4 will maintain insurance coverage as required. A certificate of insurance is available upon request. Any additional coverage required above and beyond that listed will be added at the expense of the Customer.

AGREEMENT

This SERVICES AGREEMENT (this "Agreement") is made and entered into this ___ day of April 2010 by and between Redacted Exemption 4 Corporation (the "Contractor".Exemption 4).(separately a "Party," together the "Parties") and Sapphire Energy Inc d b/a Sapphire Energy, a California (the "Company").

Recitals

A. Contractor is engaged in the business of

Redacted Exemption 4

B. The Company is engaged in the business of designing, building, selling, installing, operating and/or maintaining various types of chemical process equipment.

C. The Company desires to retain Contractor's services and Contractor desires to perform such services, on the terms and conditions set forth in this Agreement.

Agreements

In consideration of the foregoing recitals and mutual covenants set forth below, the Parties hereby agree as follows:

1. **Retention of Contractor.** The Company hereby retains Contractor's services, and Contractor hereby accepts such retention.

2. **Scope of Services; Care in Performance.** Contractor shall assign within the scope of services attached as Exhibit A to this Agreement (the "Services") individuals either by education, experience or training being competent in those areas. Contractor must render the Services with professional skill, care and diligence. Contractor shall perform the Services in a prompt, diligent and competent manner according to its own means and methods of work that is reasonably calculated to achieve the objectives of this Agreement.

3. **Compensation.**

3.1 **Fees.** As consideration for the Services, during the term of this Agreement, the Company shall pay Contractor those fees outlined in Exhibit A to this Agreement. Contractor shall not be entitled to any other compensation for Services hereunder, provided that nothing herein shall affect Contractor's right to receive certain expense reimbursements as set forth in Section 3.3 below.

4/26/10

3.2 **Manner of Payment.** Unless otherwise specifically agreed in writing by the Parties, Contractor's compensation under this Agreement shall be paid within thirty days following receipt by the Company from Contractor of an invoice therefor. Such invoice shall itemize: (i) the dates on which services were performed; (ii) the dates on which Contractor traveled or worked outside of the Company's offices; (iii) a description in reasonable detail of the services performed or document numbers of any work product created; and (iv) receipts or other appropriate documentation of any expenses for which reimbursement may be claimed.

3.3 **Expenses.** Subject to the contractors then-current policies regarding reimbursement of business and travel expenses, the Company shall reimburse Contractor for reasonable and actual documented business expenses incurred for the benefit of the Company in the course of the engagement hereunder. Expense invoices and supporting documentation satisfactory to the Company shall be submitted on a per trip basis with respect to expenses incurred during the trip. Such reimbursement shall be paid with the compensation described in Section 3.2 above.

4. **Work Product.**

4.1 **Works Made for Hire.** The Parties acknowledge and agree that all the Services performed and all Work Products (as defined below) developed for or delivered to the Company (including but not limited to those Services and Work Products described in the attached exhibits) shall be deemed to be "Works Made For Hire" or "Works for Hire" as defined in the Copyright Law of the United States.

4.2 **Ownership.** The Parties further acknowledge and agree that the Company shall have all right, title and interest in and to all data, notes, documentation, specifications, designs, flow charts, applications, utilities, programs, software files (in source and object code format), upgrades, revisions, modifications, enhancements, and any and all other materials concerning the Services, whether created or delivered on, before or after the date of this Agreement, either conceived by Contractor (alone or with others) while performing the Services, or developed in whole or in part on the Company's time, or using the Company's equipment, supplies, or facilities, or depending for effectiveness on, or incorporating, the Company's trade secrets or other intellectual property (collectively, "Work Products") including, but not limited to, any and all copyrights, inventions and patent rights in any of the foregoing. Contractor shall promptly disclose and deliver to the Company all Work Product.

4.3 **Not Joint Works.** The Work Products shall not be considered or deemed a "Joint Work," as defined in the Copyright Law of the United States, for any purpose whatsoever.

4.4 **Assignment.** To avoid any dispute regarding ownership of the Services and the Work Products, if for any reason any of the same shall not be deemed a "Work Made For Hire" or a "Work For Hire," Contractor hereby irrevocably assigns, transfers and conveys to the Company all of Contractor's right, title and interest in and to the Services and the Work Products, whether or not developed on, before or after the date of this Agreement, including, but not limited to, any copyrights, inventions and patent rights in the Services and the Work Products in the United States

4/26/11

and any all other foreign jurisdictions in the world. Without limitation, the Company shall have the sole and exclusive right to reproduce, prepare derivative works of, distribute copies, perform, display, use and modify the Work Products. Contractor shall not retain any of the foregoing rights.

4.5 **Waiver of Rights or License**. If Contractor has any rights to the Work Products that cannot be assigned to the Company under the laws of the applicable jurisdiction, Contractor unconditionally and irrevocably waives the enforcement of such rights, and all claims and causes of action of any kind against the Company with respect to such rights, and agrees, at the Company's request and expense, to consent to and join in any action to enforce such rights. If Contractor has any right to the Work Products that cannot be assigned to the Company or waived by Contractor, Contractor unconditionally and irrevocably grants to the Company during the term of such rights, an exclusive, irrevocable, perpetual, worldwide, fully paid and royalty-free license, with rights to sublicense through multiple levels of sublicensees, to reproduce, create derivative works of, distribute, publicly perform and publicly display by all means now known or later developed, such rights.

4.6 **Additional Documents**. Contractor shall, at the Company's request and expense, execute any and all other documents or instruments that may be necessary for vesting all right, title and interest in and to the Services or the Work Products in the name of the Company. Contractor agrees to cooperate in good faith with the Company to provide all such documents and instruments within a reasonable time after request.

4.7 **Warranties**. Company warrants that Company has the right to enter into this Agreement and that the Services and the Work Products provided under this Agreement shall not violate any applicable law, rule or regulation. Company shall obtain all necessary permits or licenses required to comply with any of the foregoing laws, rules or regulations.

5. **Confidentiality**. The Parties agree and acknowledge that any information provided to or developed by Contractor under the terms of this Agreement shall be deemed "Confidential Information" of Company as such term is defined in a Non-Disclosure Agreement entered into on April 10, 2010 and shall be subject to and the use thereof shall be restricted by the terms of the Non-Disclosure Agreement.

6. **Independent Contractor**. Contractor will perform the Services as an independent contractor of the Company, and this Agreement will not be construed to create a partnership, joint venture, or employment relationship between Contractor and the Company. Contractor will retain full control over the manner in which it performs the Services and will not be entitled to workers' compensation, retirement, insurance, or other benefits afforded to employees of the Company. Contractor may at any time undertake contracts for other clients, provided that this does not prejudice Contractor's performance of the Services. Anything to the contrary in this Agreement notwithstanding, Contractor shall be subject and hereby agrees to perform the Services in accordance with the Company's Responsibility Guide for Suppliers, Contractors and Vendors, attached to this Agreement as Exhibit B.

4/26/10

6.1 **Purchase Order.** As a contractor each new job order or request shall be in the form of a purchase order to EFSERV giving a description of the work, shipping instruction and any other critical time information and firm price for the work or in the case of a cost plus purchase or ongoing service agreement an order a not to exceed amount.

7. **Insurance; Compliance with Laws; Damage.** Contractor and Company shall each be responsible for providing their own workman's compensation, liability, property damage and all other relevant kinds and forms of insurance as required by law and shall comply fully with all laws and regulations applicable to their businesses or the services described in this Agreement. In the event that either fails to carry such insurance, it shall indemnify and hold harmless the other, its agents and employees from and against any damages, claims, and expenses arising out of or resulting from work conducted by its agents or employees.

8. **Indemnification.**

8.1 **By the Company.** The Company will indemnify, defend and hold Contractor harmless from all liability, suits, judgments, claims, damages, losses and expenses (including attorneys' fees) arising out of or resulting from any claim, action or other proceeding initiated by any third party that is based upon Contractor providing equipment or services as required under this Agreement and or as directed by the Company.

Company shall defend, indemnify, and hold the Contractor harmless from and against any liability, suits, claims, losses, damages and judgments, and shall pay all costs (including reasonable attorney's fees) and damages arising from a claim: (a) that the Services or any Work Product commissioned by the Company and delivered by Contractor under the terms of this Agreement infringe any third party's patent, copyright, trademark or other intellectual property interest unless said infringement is due to an act solely at the discretion of the contractor.

8.2 **By Contractor.** Contractor shall defend, indemnify, and hold the Company harmless from and against any liability, suits, claims, losses, damages and judgments, and shall pay all costs (including reasonable attorney's fees) and damages arising from a claim that is based on Contractor's negligent performance in the supply of Equipment or Services.

Contractor shall in no way be liable for any concinquencial damages beyond the correction or replacement of any defective component, workmanship or service.

The provisions of this Section 8 shall survive the termination of this Agreement.

9. **No Assignment or Delegation.** Neither parties' rights nor obligations under this Agreement shall not be assigned or delegated except with the prior written consent of the other party. Any attempt to assign or delegate without such consent shall be ineffective.

4/26/0

10. **Term.** This Agreement commences on the date first written above (the "Effective Date") and continues in full force and effect until the expiry of twelve months from the Effective Date (the "Term"). The Parties may agree to extend this Agreement at any time during the Term.

11. **Termination.** This Agreement shall become effective on the date hereof and shall continue in full force and effect until terminated in accordance with this Section 11. This Agreement shall terminate upon the occurrence of any of the following events.

11.1 Mutual agreement to termination in writing by the Company and Contractor;

11.2 Fifteen (15) days prior written notice of termination given by either Party to the other; or

11.3 Failure by either Party to cure any other breach of this Agreement within seven (7) days after written notice of such breach from the other Party.

12. General Provisions

12.1 **Entire Agreement.** This Agreement contains the entire agreement among the Parties relating to the subject matter hereof and supersedes any and all prior agreements or understandings, written or oral, among the Parties related to the subject matter hereof. No modification of this Agreement shall be valid unless made in writing and signed by the Parties.

12.2 **Governing Law.** This Agreement shall be governed by and construed in accordance with the laws of the State of Delaware.

12.3 **Binding Effect.** Except as otherwise provided, this Agreement shall be binding upon and inure to the benefit of the Parties and their respective successors and assigns.

12.4 **Counterparts.** This Agreement may be executed simultaneously in counterparts each of which shall be an original, but all of which together shall constitute one and the same instrument.

12.5 **Facsimile/PDF Transmission.** Facsimile or PDF transmission of any signed original document, and retransmission of any signed facsimile or PDF transmission, shall be the same as transmission of an original. At the request of either Party, the Parties will confirm signatures transmitted by facsimile by signing an original document.

12.6 **Dispute Resolution.** The Parties agree to first try to resolve any dispute or controversy arising out of, in connection with, or relating to this Agreement between them. If they are unable to do so, the Parties then agree to seek mediation before a mediator acceptable to each of the Parties.

4/26/10

12.7 **Notice.** Any notice required or permitted hereunder shall be given in writing either by personal delivery or by mail to the address set forth below the Parties' respective signatures. The date upon which any such notice is so personally delivered or if such notice is given by mail, the date upon which it is received by the addressee, shall be deemed to be the effective date of such notice.

12.8 **Waiver.** The waiver by either Party of any breach or failure to enforce any of the terms and conditions of this Agreement at any time shall not in any way affect, limit, or waive such party's right thereafter to enforce and compel strict compliance with every term and condition of this Agreement.

EXECUTED as of the day and year first above written.

Redacted Exemption 4	SAPPHIRE ENERGY INC, a California corporation X Jaime E. Moreno Jaime E. Moreno, P.E. Vice President Address: 27101 Puerta Real Suite 200 Mission Viejo, California 92691 Telephone No: (949) 202 4700

4/26/10

SOLVENT
PR.100012.200

11:17 AM
11/04/10
Accrual Basis

Redacted Exemption 4

Sales by Customer Summary

August 1 through November 4, 2010

	Aug 1 - 14, 10	Aug 15 - 28, 10	Aug 29 - Sep 11, 10	Sep 12 - 25, 10	Sep 26 - Oct 9, 10	Oct 10 - 23, 10	Oct 24 - Nov 4, 10	TOTAL
Sapphire Energy								
1141			Redacted Exemption 4					
Total Sapphire Energy								
TOTAL								

HTTU
PR.100012.100

11:20 AM
11/04/10
Accrual Basis

Redacted Exemption 4

Sales by Customer Summary

June 5 through November 4, 2010

	Jun 5 - 19, 10	Jun 20 - Jul 17, 10	Jul 18 - Aug 14, 10	Aug 15 - Sep 11, 10	Sep 12 - Oct 9, 10	Oct 10 - Nov 4, 10	TOTAL
Sapphire Energy							
1126	—	Redacted Exemption 4					
Total Sapphire Energy	—						
TOTAL							

Sapphire Energy

CHANGE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353

Date: 19 August 2010

VENDOR Redacted Exemption 4

SHIP TO
Bryn Davis
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88001
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Per proposal	Per proposal	Per proposal

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
		Redacted Exemption 4		

1. Please mail two copies of your invoice.
2. Please notify us immediately if you are unable to ship as specified.
3. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

8/19/2010

Authorized by *Date*

Item #	
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Redacted Exemption 4

Item #
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Redacted Exemption 4

Extraction Equipment Purchase Orders

Sapphire Energy

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001093
Date: 21 May 2010

VENDOR Redacted Exemption 4

SHIP TO
Bryn Davis
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88001
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
n/a	n/a	n/a

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
		Redacted Exemption 4		

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Authorized by

5/19/2010
Date

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number:1001385
Date: 28 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
		Redacted Exemption 4		

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. **Send all correspondence to:**
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Authorized by 6/28/2010 *Date*

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1000783
Date: 19 April 2010

VENDOR Redacted Exemption 4

SHIP TO
Bryn Davis
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
Redacted Exemption 4				

1. Please send two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Jaime G. Moreno 04/19/10

Authorized by *Date*

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

detail follows

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001204
Date: 4 June 2010

VENDOR Redacted Exemption 4

SHIP TO
Bryn Davis
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
Redacted Exemption 4				

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Jaime G. Moreno 6/3/2010

Authorized by *Date*

Redacted Exemption 4

("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001384
Date: 28 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
Redacted Exemption 4				

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. **Send all correspondence to:**
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Authorized by 6/28/2010 *Date*

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001203
Date: 4 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL

Redacted Exemption 4

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL

Redacted Exemption 4

Redacted
Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

6/3/2010

Authorized by *Date*

Redacted

Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001206
Date: 7 June 2010

VENDOR Redacted Exemption 4

SHIP TO
Bryn Davis
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
Redacted Exemption 4				

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Authorized by *Date* 6/7/2010

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001235
Date: 9 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL

Redacted Exemption 4

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

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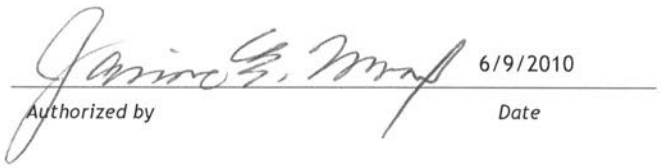
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650



6/9/2010

Authorized by *Date*

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Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001258
Date: 10 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
Redacted Exemption 4				

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QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL

Redacted Exemption 4

Redacted Ex. 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
		Redacted Exemption 4		

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

6/10/2010

Authorized by *Date*

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Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001259
Date: 11 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL

Redacted Exemption 4

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
		Redacted Exemption 4		

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4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Jaime M. Moreno — 6/11/2010

Authorized by — *Date*

Redacted Exemption 4 ("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001260
Date: 11 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL

Redacted Exemption 4

Redacted Exemption 4 agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
		Redacted Exemption 4		

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Authorized by *Date* 6/11/2010

Redacted Exemption 4 agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001274
Date: 14 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL

Redacted Exemption 4

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Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001274
Date: 14 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
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   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Jaime E. Moreno — 6/14/2010

Authorized by — *Date*

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Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001289
Date: 15 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
Redacted Exemption 4				

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Jaime G. Moreno 6/15/2010

Authorized by *Date*

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Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001310
Date: 17 June 2010

VENDOR Redacted Exemption 4

SHIP TO
Bryn Davis
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL

Redacted Exemption 4

1. Please mail two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.
4. Send all correspondence to:
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Authorized by — Date: 6/17/2010

Redacted Exemption 4("Supplier") agrees to maintain in strictest confidence all information Sapphire Energy, Inc. ("Company") provides in connection with this Purchase Order, including but not limited to Company's information pertaining to its products, financial condition, business plans, construction plans, designs, customer identities, partner identities, collaborator identities, vendor identities, technical information, and similar information, and to hold in trust and use such information only as needed to fulfill Supplier's obligations for Company's sole benefit. Supplier shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Company, and shall carefully restrict access to such information to those of its employees who clearly require it in order for Supplier to fulfill its obligations under this Purchase Order and who have executed confidentiality agreements consistent with Supplier's obligations under this agreement. On termination of Supplier's obligations under this Purchase Order, Supplier shall return to Company all copies of all information provided by Company to Supplier, including partial copies and derivative works of such information, except that Supplier may retain one copy of this Purchase Order for archival purposes. Supplier may disclose Company information if required by court order.

From:	Sterner, Christy
To:	Hames, Molly
Subject:	FW: Sapphire
Date:	Thursday, July 28, 2011 11:23:35 AM
Attachments:	FONSI - Sapphire Energy, Inc.pdf

Here is Sapphire's FONSI.

-----Original Message-----
From: Kerwin, Kristin
Sent: Thursday, August 05, 2010 1:14 PM
To: Sterner, Christy; English, Christine
Cc: Craig, Kevin
Subject: Sapphire

Hi all,

Just wanted you to know that the FONSI has been signed for Sapphire. I haven't posted it to the Reading Room yet (there are major technical difficulties with the documents in the Reading Room at the moment), but I will as soon as I can.

Have a great afternoon,

Kristin Kerwin
NEPA Compliance Officer
U.S. Department of Energy
Golden Field Office
NEW telephone: 720.356.1564
NEW fax: 720.356.1650

Pretreatment Equipment Purchase Orders

Sapphire Energy

Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number:1001410
Date: 1 July 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
		Redacted Exemption 4		

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   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Authorized by 7/1/2010 *Date*

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Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001601
Date: 28 July 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL

Redacted Exemption 4

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2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
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4. **Send all correspondence to:**
   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Jaime G. Moreno 7/28/2010

Authorized by *Date*

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PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: **1000687**
Date: 06 April 2010

VENDOR Redacted Exemption 4

SHIP TO
Bryn Davis
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
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   Jaime Moreno
   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

04/06/10

Authorized by *Date*

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Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: 1001276
Date: 14 June 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE
Best Way	FOB Ship Point	Per Reference Quote

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
Redacted Exemption 4				

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   27101 Puerta Real, Suite 280
   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Jaime E. Moreno — 6/14/2010
Authorized by — *Date*

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Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: **1000735**
Date: 12 April 2010

VENDOR Redacted Exemption 4

SHIP TO **Bryn Davis**
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
		Redacted Exemption 4		

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   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Authorized by 04/12/10 *Date*

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Sapphire Energy

PURCHASE ORDER

3115 Merryfield Row, San Diego, CA 92121
Phone 858-768-4708 Fax 888-501-8353
nick.herrera@sapphireenergy.com

PO Number: **1000736**
Date: 12 April 2010

VENDOR Redacted Exemption 4

SHIP TO
Bryn Davis
Sapphire Energy, Inc.
9035 Advancement Ave.
West Mesa Industrial Park
Las Cruces, NM 88007
Bryn.davis@sapphireenergy.com

SHIPPING METHOD	SHIPPING TERMS	DELIVERY DATE

QTY	ITEM #	DESCRIPTION	UNIT PRICE	LINE TOTAL
Redacted Exemption 4				

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   Mission Viejo, CA 92691-8009
   Phone 949-202-4702 Fax 949-367-0650

Authorized by 04/12/10 *Date*

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