NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

August 11, 2011

Dear Reader:

The enclosed draft environmental assessment (EA) for the Utah Coal and Biomass Fueled Pilot Plant Project, Kanab, Utah, (Draft EA-1870D) was prepared by the U.S. Department of Energy (DOE) in accordance with the Council on Environmental Quality's National Environmental Policy Act (NEPA) implementing regulations (40 CFR Parts 1500 to 1508) and DOE's NEPA implementing procedures (10 CFR Part 1021). The draft EA evaluates the potential environmental impacts of DOE providing cost-shared funding under a cooperative agreement with Viresco Energy, LLC, (Viresco) for its construction and operation of a pilot-scale gasification facility. The objective of Viresco's proposed project is to conduct a pilot-scale evaluation of the Steam Hydrogasification Reaction process to determine the technical feasibility of using steam hydrogasification to convert coal and biomass such as agricultural or wood processing waste into synthesis gas, and ultimately into clean domestic fuels. The plant would receive and process a maximum of 5 tons of coal or coal-biomass mixtures per day. The plant would be located on approximately 1.5 acres about 2.5 miles south of Kanab in Kane County, Utah.

DOE's proposed action would meet the requirements of the Congressional earmark in the Fiscal Year 2010 Appropriations Act (Public Law 111-85) and its accompanying Conference Report (Conf. Rep. 111-278 (Sept. 30, 2009)). The technology that the plant would demonstrate at a pilot-scale may be capable of producing fuels from domestic coal and renewable resources. The successful operation of the proposed pilot plant would provide engineering information needed to develop a commercialization pathway for this process. The addition of biomass to the coal feedstock also reduces net greenhouse gas emissions. Under the cost-sharing agreement, DOE would provide $2,404,000 (approximately 80 percent of the total cost of the research and development project) and Viresco would contribute the remaining $601,000.

The draft EA evaluates the potential environmental impacts of Viresco's proposed project. Viresco would operate the facility and collect data for 30 days of operation over a period of months under DOE's cooperative agreement; after DOE's financial assistance ends, Viresco plans to seek additional funding for continued operations. These operations would be limited by funding available and are not expected to exceed 130 days of operation in any year, including a possible 90-day continuous test run. DOE considers the possible continued operation of the pilot plant as a connected action under NEPA in the EA.

The draft EA evaluates 13 environmental resource areas and identifies no significant adverse environmental impacts for the proposed project. Based on initial screening evaluations, DOE determined that no or negligible impacts would occur in three of these resource areas. Additional impact evaluations for air quality, greenhouse gases, soils, groundwater, materials and waste, utilities, and public health and safety identified minimal impacts from the proposed project's construction and operation. Impact evaluations for aesthetics and land use indicated minor to moderate impacts. In this draft EA, potential cumulative impacts of the proposed project with

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other past, present, or future actions are also evaluated, and adverse cumulative impacts from negligible to minor were identified. The proposed project would also have the beneficial socioeconomic impact of creating jobs during construction and operation.

DOE will publish a Notice of Availability in the *Southern Utah News* on August 17, 2011, and in *The Spectrum & Daily News* on August 21, 22 and 23, 2011 to announce the beginning of the 30-day public review and comment period. As stated in the notice, comments should be marked "Utah Coal and Biomass Fueled Pilot Plant Project Draft EA Comments" and sent to:

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Individual names and addresses, including email addresses, which DOE receives as part of the comment process, are normally considered part of the public record. Persons who wish to withhold name, address, or other identifying information from the public record must state this request prominently at the beginning of the comment document. DOE will honor this request to the extent allowable by law. All submissions from organizations, businesses, and individuals who identify themselves as representatives or officials of organizations or businesses will be included in the public record and open to public inspection in their entirety.

The public comment period formally begins on August 18, 2011, and ends on September 16, 2011. DOE will consider late submissions to the extent practicable. The draft EA can also be accessed from DOE's National Energy Technology Laboratory (NETL) website at http://www.netl.doe.gov/publications/others/nepa/ea.html.

Sincerely,

Joseph Zambelli

Joseph Zambelli
NEPA Document Manager

# Draft Environmental Assessment

# Utah Coal and Biomass Fueled Pilot Plant
# Kanab, Utah

## DOE/EA-1870D

August 2011

U.S. Department of Energy
National Energy Technology Laboratory

**Cover Sheet**

**Responsible Agency: U.S. Department of Energy**

**Title:** Draft Environmental Assessment for the Utah Coal and Biomass Fueled Pilot Plant (DOE/EA-1870D)

Location: Kanab, Utah

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**Abstract:**
The U.S. Department of Energy (DOE) prepared this Environmental Assessment (EA) to evaluate the potential impacts of providing financial assistance to Viresco Energy, LLC, (Viresco) for its construction and operation of a Coal and Biomass Fueled Pilot Plant, that would be located in Kanab, Utah. The plant would be located on land leased to Viresco by the Utah School and Institutional Trust Lands Administration. The Pilot Plant would occupy approximately 1.5 acres of a 10-acre site located approximately 2.5 miles south of the downtown area of Kanab, Utah.

The Fiscal Year 2010 Appropriations Act for Energy & Water Development and Related Agencies (Public Law 111-85) included a $2,500,000 earmark sponsored by then Senator Bennett of Utah for the "Utah Coal and Biomass Fueled Pilot Plant." In accordance with the earmark, DOE would provide financial assistance to Viresco to support its design, construction, and testing of a pilot-scale steam hydrogasification facility. Under a cost-sharing agreement, DOE would provide $2,404,000 (approximately 80 percent of the total cost of the research and development project) and Viresco would contribute the remaining $601,000. The Pilot Plant would be constructed, owned and operated by Viresco. Viresco is responsible for obtaining the permits and other authorizations needed for the project; DOE would have no regulatory authority over the project or its operation. Under the cooperative agreement Viresco would operate the Pilot Plant and collect data for a series of test runs totaling 30 days of operation over a period of months; after DOE's financial assistance ends, Viresco plans to seek additional funding for continued operations.

The objective of Viresco's proposed project is to conduct a pilot-scale evaluation of the Steam Hydrogasification Reaction (SHR) process. The Pilot Plant would be a small-scale facility designed to evaluate the technical feasibility of using steam hydrogasification to convert coal and biomass (such as agricultural or wood processing waste) into synthesis gas (syngas), and ultimately into clean fuels such as substitute natural gas, sulfur-free Fischer-Tropsch diesel, jet fuel, dimethyl ether, and methane. The successful operation of this SHR gasification technology at a pilot scale would provide engineering information needed to develop a commercialization pathway for this process. This project supports DOE's goal of developing and using domestic coal and renewable resources in an efficient and environmentally acceptable manner. This technology uses an advanced gasification process and produces clean fuels. The addition of biomass to the coal feedstock also reduces net greenhouse gas (GHG) emissions.

The EA found that the most notable potential changes from Viresco's proposed project would occur in the following areas: land use, air quality, solid and hazardous wastes, utilities, and socioeconomics. No significant environmental effects were identified in analyzing these potential changes.

**Public Participation:**
The DOE encourages public participation in the National Environmental Policy Act (NEPA) process. Based on early local interest in the project, the DOE's public involvement effort for the Utah Coal and Biomass Fueled Pilot Plant EA was more extensive than usually undertaken for an EA. The effort included a public scoping meeting in Kanab, as well as outreach to Federal, state, and local agencies; Native American tribes; and members of the public. The DOE coordinated with the U.S. Fish and Wildlife Service (USFWS), the Utah Department of Natural Resources (UDNR), Division of Wildlife Resources, and the State Historic Preservation Office (SHPO) for compliance with Federal regulations, and also consulted with the Kaibab Band of Paiute Indians and the Hopi tribe.

The Draft EA was distributed to members of the public and made available on the DOE website at http://www.netl.doe.gov/nepa/. It will be discussed at a public hearing in Kanab, Utah on August 30, 2011, and the public is invited to provide oral, written, or e-mail comments on the Draft EA to the DOE by the close of the comment period on September 16, 2011. Copies of the Draft EA were also distributed to cognizant Federal, state, and local agencies; Native American tribes; and organizations.

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AQCR | Air Quality Control Region |
| AQCR 014 | Four Corners Interstate Air-Quality Control Region |
| BMP | Best Management Practice |
| CAA | Clean Air Act |
| CX | Categorical Exclusion |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| DAQ | Division of Air Quality |
| dBA | Decibel, A-weighted scale |
| DOE | Department of Energy |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Map |
| FONSI | Finding of No Significant Impact |
| GHG | Greenhouse Gases |
| gpd | gallons per day |
| HAP | Hazardous Air Pollutant |
| HDPE | High Density Polyethylene |
| kW | kilowatts |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NETL | National Energy Technology Laboratory |
| NHPA | National Historic Preservation Act |
| NPDES | National Pollutant Discharge Elimination System |
| NRHP | National Register of Historic Places |
| NSPS | New Source Performance Standards |
| NSR | New Source Review |
| NWI | National Wetland Inventory |
| OSHA | Occupational Safety and Health Administration |
| PM10 | particulate matter less than 10 microns in diameter |
| PM2.5 | particulate matter less than 2.5 microns in diameter |
| ppm | parts per million |
| PSD | Prevention of Significant Deterioration |
| ROD | Record of Decision |

| | |
|---|---|
| SHPO | State Historic Preservation Office |
| SHR | Steam Hydrogasification Reaction |
| SIP | State Implementation Plans |
| SITLA | School and Institutional Trust Lands Administration |
| SPCC | Spill Prevention, Control and Countermeasure Plan |
| SWPPP | Stormwater Pollution Prevention Plan |
| tpd | tons per day |
| tpy | tons per year |
| UDEQ | Utah Department of Environmental Quality |
| UCR | University of California, Riverside |
| USC | United States Code |
| USEPA | United States Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Services |
| VOC | volatile organic compound |

# 1.0 PURPOSE AND NEED

## 1.1 Introduction and Background

The DOE prepared this Environmental Assessment (EA) in accordance with the NEPA of 1969, as amended (42 United States Code [USC] 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations (Title 40, Code of Federal Regulations [CFR], Parts 1500-1508); and the DOE's NEPA Implementing Procedures (Title 10, CFR, Part 1021). The EA evaluates the potential impacts from the construction and operation of a Coal and Biomass Fueled Pilot Plant that would be located in Kanab, Utah (hereafter referred to as the "proposed project" or the "Pilot Plant"). The Pilot Plant would convert wet carbonaceous feedstocks such as coal and lignocellulosic biomass into synthesis gas (syngas) suitable for further processing to liquid fuel or to substitute natural gas.

> ***Lignocellulosic biomass****: plant biomass that is composed of cellulose, hemicellulose, and lignin. The carbohydrate polymers (cellulose and hemicelluloses) are tightly bound to the lignin. Lignocellulosic biomass can be grouped into four main categories: agricultural residues (including corn stover and sugarcane bagasse), dedicated energy crops, wood residues (including sawmill and paper mill discards), and municipal paper waste.*
>
> ***Synthesis Gas:*** *a mixture of carbon dioxide, carbon monoxide, and hydrogen made by using water gas and reacting it with steam to enrich the proportion of hydrogen.*

The Fiscal Year 2010 Appropriations Act for Energy & Water Development and Related Agencies (Public Law 111-85) included a $2,500,000 earmark sponsored by then Senator Bennett of Utah for the "Utah Coal and Biomass Fueled Pilot Plant." In accordance with the earmark, DOE would provide financial assistance to Viresco Energy, LLC (Viresco) to support its design, construction, and testing of a pilot-scale steam hydrogasification facility. Under a cost-sharing agreement, DOE would provide $2,404,000 (approximately 80 percent of the total cost of the research and development project) and Viresco would contribute the remaining $601,000. The Pilot Plant would be constructed, owned and operated by Viresco. Under the cooperative agreement Viresco would operate the Pilot Plant and collect data for a series of test runs totaling 30 days of operation over a period of months; after the DOE's financial assistance ends, Viresco plans to seek additional funding for continued operations. These operations would be limited by the funding available and the conditions of permits and would probably not exceed 130 days of operation in any year, including a possible 90-day continuous test run. The Pilot Plant would be decommissioned and the site restored no later than the end of the site lease period. The City of Kanab would be responsible for the supply of water (used in feedstock for the gasifier) to the Pilot Plant and disposal of the sanitary wastewater. Viresco would be responsible for the disposal of the solid waste (i.e., coal ash) and the process wastewater from the Pilot Plant.

The purpose of this EA is to determine whether the project would cause significant adverse impacts to the environment. If potentially significant adverse impacts are identified and, if they cannot be mitigated or avoided, then a more detailed Environmental Impact Statement (EIS) would be required. If no significant impacts are identified, a Finding of No Significant Impact (FONSI) would be prepared by DOE and made available to the public before DOE provides funds for construction (see Section 1.3 for a more detailed discussion on the NEPA process).

This EA follows the organization recommended by the CEQ regulations (40 CFR, Parts 1500-1508) and includes the following sections:

- Section 1 – Purpose and Need
- Section 2 – Description of Proposed Action and No Action Alternative
- Section 3 – Existing Conditions and Environmental Consequences
- Section 4 – Cumulative Impacts
- Section 5 – Short Term Uses vs. Long Term Productivity

- Section 6 – References
- Section 7 – List of Preparers
- Section 8 – Distribution List
- Appendices A through D

## 1.2 Purpose and Need for Department of Energy Action

The purpose and need for DOE's action is to meet the requirements of the Congressional earmark in the Fiscal Year 2010 Appropriations Act and its accompanying Conference Report (Conf. Rep. 111-278 (September 30, 2009)). The technology to be demonstrated at a pilot scale would also contribute to the goal of producing fuels using domestic renewable energy resources. The National Energy Technology Laboratory (NETL) is a part of DOE's national laboratory system. NETL is dedicated to the research, development, and technology transfer for fossil energy, renewable energy, and energy efficiency technologies. NETL supports DOE's mission to advance the national, economic, and energy security of the United States, enabling domestic coal, natural gas, and oil to economically power our Nation's homes, industries, businesses, and transportation, while protecting our environment and enhancing our energy independence.

Viresco has been involved in the funding and development of a gasification technology conceived by the University of California, Riverside (UCR) College of Engineering's Center for Environmental Research and Technology. This gasification technology is based on the SHR process. UCR and Viresco have conducted research on this gasification technology in a laboratory-scale batch process and the results indicate that this technology has the potential to be a commercially viable means to produce fuels using domestic resources. A system analysis study of the technology concluded that the process proposed by Viresco has the potential to reduce capital costs and achieve higher conversion efficiencies compared to conventional, partial oxidation-based gasification processes. The next step in development of this technology is to evaluate the process at a larger scale (i.e. pilot scale).

The objective of Viresco's proposed project is to conduct a pilot-scale evaluation of the SHR process. The Pilot Plant would be a small-scale facility designed to evaluate the technical feasibility of using steam hydrogasification to convert coal and/or biomass such as agricultural or wood processing waste into synthesis gas (syngas), and ultimately into clean fuels such as substitute natural gas, sulfur-free Fischer-Tropsch diesel, jet fuel, dimethyl ether, and methane. Hydrogasification causes wet coal and other biomass to react with hydrogen at high temperature and pressure to produce syngas. Although no coal or biomass would be directly combusted at the proposed facility, the feedstock (coal with or without biomass) would be gasified and the char produced from gasification would be combusted in the regeneration step. All operations at the proposed facility would be on a testing scale; there would be no full-scale production of fuels derived from processing of the syngas generated in the gasification process or storage of such fuels at the site.

The successful operation of this SHR gasification technology at pilot scale would provide engineering information needed to develop a commercialization pathway for this process. This project supports NETL's goal of developing and using domestic coal and renewable resources in an efficient and environmentally acceptable manner. This technology uses an advanced gasification process and produces clean fuels. The addition of biomass to the coal feedstock also reduces net greenhouse gas (GHG) emissions.

## 1.3 National Environmental Policy Act and Related Procedures

DOE prepared this EA in accordance with the NEPA, as amended (42 USC 4321), and the President's Council on Environmental Quality regulations for Implementing the Procedural Provision on NEPA (40 CFR 1500-1508). NEPA requires that a Federal agency proposing a Federal action must:

- Assess the environmental impacts of any Proposed Action;

- Identify adverse environmental effects that cannot be avoided, should the Proposed Action be implemented;
- Evaluate alternatives to the Proposed Action, including a No Action Alternative; and
- Describe the cumulative impacts of the Proposed Action and other planned projects in the area of the site.

NEPA requires Federal agencies to take into account the potential consequences of their actions on both the natural and human environments as part of their planning and decision-making processes. To facilitate these considerations, a number of typical actions that have been determined to have little or no potential for adverse impacts are "categorically excluded" from the detailed NEPA assessment process. Thus, the first step in determining if an action would have an adverse effect on the environment is to assess whether it fits into a defined category for which a Categorical Exclusion (CX) is applicable. If a CX is applied, the agency prepares a record of categorical exclusion to document the decision and may proceed with the action.

For actions that are not subject to a CX, the agency prepares an EA to determine the potential for significant impacts. If through the evaluation and analysis conducted for the EA process, it is determined that no significant impacts would occur as a result of the action, then the agency prepares and issues a FONSI. The NEPA process is complete when the FONSI is executed.

If significant adverse impacts to the natural or human environment are indicated or other intervening circumstances exist either at the onset of a project or if determined through the EA process, an EIS may be prepared. An EIS is a more intensive study of the effects of the Proposed Action and requires more rigorous public involvement. The agency formalizes its decisions relating to an action for which an EIS is prepared in a Record of Decision (ROD). Following a 30-day waiting period after publication of the ROD in the Federal Register, the NEPA process is complete (see Figure 1-1 for a flow chart of the NEPA Process).

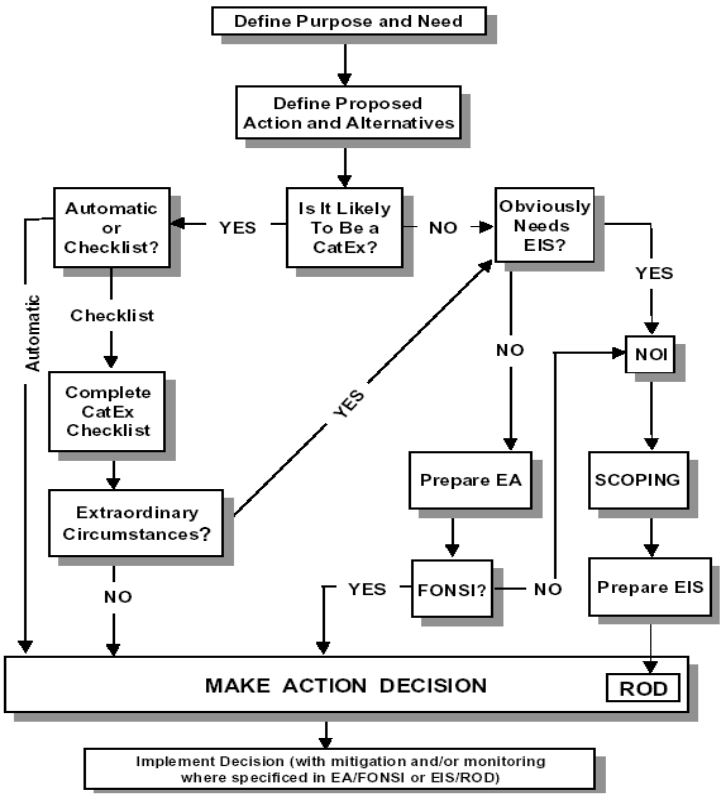


**Figure 1-1. The NEPA Process**

## 1.4 Public Involvement and Agency Consultation

Based on early local interest in the project, the public involvement effort for the Utah Coal and Biomass Fueled Pilot Plant EA was more extensive than usually undertaken for an EA. DOE received comments about the proposed Pilot Plant from 99 members of the public before the EA was initiated. Additionally, the Environmental Program Manager for the Kaibab Band of Paiute Indians contacted the DOE NEPA Document Manager in January 2011, before the EA was initiated, stating that the tribe was concerned about the project and requested to be consulted on DOE's action. In February 2011, the tribal representative explained that the Kaibab Band's level of concern resulted from the discovery of Native American remains during construction at the Jackson Flat Water Supply Storage Project, which is located approximately 0.25 mile north of the proposed Pilot Plant site. As a result of the enhanced local interest, DOE chose to initiate a public scoping process comparable to one normally conducted for an EIS.

The public scoping process included the scheduling of a public scoping meeting in Kanab (Figure 1-2), as well as outreach to Federal, state, and local agencies; Native American tribes; and members of the public. DOE sent notices (see examples in Appendix A) to these organizations and individuals informing them of the meeting and inviting them to comment on the proposed project and the scope of the EA. DOE also initiated contact with The USFWS, the Utah Department of Natural Resources (UDNR), Division of Wildlife Resources, and the SHPO for consultation under Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act (NHPA). Copies of letters and responses are included in Appendix A. Additionally, DOE sent staff-to-staff-level consultation letters on May 6, 2011 to 17 Native American tribes in the region based on a database maintained by the U.S. Department of Interior. In addition to the Kaibab Band, which had already contacted DOE, the Hopi and Navajo tribes expressed an interest in coordinating with DOE on the proposed project. The Hopi requested a copy of the cultural report completed in 2010 for the proposed project site and, after reviewing the report, the Director of the Hopi Cultural Preservation Office sent a response in a letter dated June 6, 2011 stating that the proposed project is unlikely to affect cultural resources significant to the tribe (see Appendix A). The Navajo responded in a letter dated July 5, 2011, noting that the proposed project would not impact traditional cultural resources but also asked that they be notified if cultural resources of significance are discovered on-site during construction. In aggregate, the public scoping distribution included 80 notices sent by U.S. Mail and 84 notices distributed by email.

**Figure 1-2. Scoping Meeting, May 18, 2011 at Kanab Middle School**

DOE held a public scoping meeting on May 18, 2011 at the Kanab Middle School cafeteria in Kanab, Utah, which was attended by 129 people. DOE published notices in two regional newspapers (Southern Utah News and The Spectrum) on May 8th, 11th, and 18th announcing the meeting location and time. The scoping meeting began with an informal open house from 5:00 pm to 7:00 pm, during which time attendees were able to view project-related posters and ask questions of DOE and Viresco representatives. The informal open house was followed by formal presentations given by DOE and Viresco and then the formal comment period, all of which were transcribed by a court reporter. Oral comments were made by 21 individuals at the scoping meeting. The public scoping period ended on June 17, 2011, after a 30-day comment period.

In conjunction with the public scoping meeting in Kanab, DOE made arrangements to meet with the Kaibab Band at their monthly Council Meeting on May 19, 2011 and sent all presentation items to the tribe prior to the meeting as requested. The meeting was attended by two DOE representatives, including the NEPA Document Manager for EA. At the meeting, council members expressed their dissatisfaction that a DOE Tribal Liaison representative and the DOE Technical Project Manager were not in attendance. Council members were also offended that DOE had scheduled the public meeting before meeting with the tribe, and they disagreed with DOE's presentation at the public meeting, which implied that formal consultation had been initiated with the tribe. The Kaibab Band subsequently sent a letter to DOE, dated June 13, 2011 (Appendix A), reiterating the concerns expressed at the Tribal Council Meeting and outlining their environmental concerns about the proposed project. DOE responded to the Kaibab Band's concerns by initiating formal government-to-government consultation with attendance at a Tribal Council meeting on July 21, 2011. DOE also followed up with a letter date August 1, 2011, to the Tribal Council (see Appendix A).

DOE representatives attending the Kaibab Band Tribal Council on July 21, 2011 included the Director for Tribal and Intergovernmental Affairs, a Senior Program Analyst, the Project Manager, and the NEPA Document Manager. Council members requested that DOE provide a written statement retracting the comment noted on one of the slides shown to the citizens of Kanab during the May 18th scoping meeting presentation stating that consultation with the Kaibab had already begun. They also expressed their desire to engage in a written agreement outlining how the Kaibab could be an active participant in the decision process regarding any unanticipated discovery of cultural resources, artifacts, human remains, or burial sites, should such be located on-site during construction. In addition, they asked to be granted access to the site and that they be provided with periodic updates on the project's status and progress.

Council and tribal members provided additional scoping comments that included: 1) a request that an EIS be prepared due to the project's potential for causing environmental impacts that could destroy their land; 2) a concern about the potential for impacting previously undiscovered burial grounds that may be located on the proposed project site; and 3) a concern that radioactive particles would be released into the air by burning coal in the proposed pilot plant. The Kaibab Band also provided DOE with a list of culturally significant plants and animals, requesting that they be taken into consideration in preparation of the environmental analysis.

Charley Bulletts of the Southern Paiute Consortium expressed numerous concerns about the proposed project and provided the following scoping comments: 1) that the increasing number of federal projects in the desert southwest are having adverse impacts on water demand and supplies; 2) that the water stored in the Jackson Flat Reservoir project will be used for the coal gasification pilot plant and not for irrigation and recreation, as originally planned; 3) that the proposed project's emissions will generate pollution, which will adversely impact medicinal plants that grow in the area; 4) that DOE and other federal government agencies need to improve their communication with the Tribes and provide regular meeting updates; 5) that he is opposed to the proposed coal gasification project's current location and believes the site was selected due to its proximity to nearby surface mines, which would provide the coal; 6) that different government offices often provide inconsistent information or offer different stories when contacted; 7) that the Kaibab are very unhappy that cultural resources and burial sites were disturbed at the nearby Jackson Flat Reservoir project; and 8) that Water to Tribes is a living Breathing element and like all things living if it's abused it will show us it's Strength.

In response to the Kaibab Tribal Council's request for a written retraction, the DOE sent Chairman Manuel Savala a letter on August 1, 2011, expressing their regret that previously noted statements incorrectly implied that formal government-to-government consultation had occurred prior to the public meeting on May 18, 2011(Appendix A). DOE intends to continue consultation with the Kaibab Band throughout the NEPA process.

DOE also received scoping comments from an attorney representing the Taxpayer Association of Kane County, which informed DOE that a legal petition had been filed with the City of Kanab that would require that its pending conditional use permit application be subject to approval by a vote of the citizens of the City of Kanab. Shortly thereafter, DOE received a supplemental scoping letter on July 11, 2011, informing DOE of the risks of proceeding with funding the project in light of the pending citizen initiative. This letter also requested that the DOE stop any further preparation of the EA and prohibit any funding release until the citizen initiative for the Viresco coal gasification pilot plant was completed. On August 2, 2011, the attorney representing the Taxpayer Association of Kane County again contacted DOE informing them that they were appealing the conditional use permit issued by the City of Kanab on July 20, 2011. The appeal was dated July 29, 2011.

## 1.5 Comments Received and Issues Identified During the Scoping Period

DOE received scoping comments with respect to specific natural and human environmental resources. Comments were expressed orally by individuals attending the scoping meeting; others were received on comment forms provided at the meeting, as well as by letter or email. Some commenter's expressed support for the Pilot Plant, primarily for the technological aspects, including potential environmental benefits of clean domestic fuels and the use of renewable biomass. The majority of commenters expressed opposition to the Pilot Plant, primarily based on concerns about air quality, odors, visual aesthetics, effects on local economy (as a result of decreased tourism), among others. In all, 192 separate submissions of oral and written comments were received from a total of 146 individual commenters. Many commenters addressed multiple issues, resulting in a total of 803 comments on specific issues. Figure 1-3 illustrates the distribution of comments by subject matter.

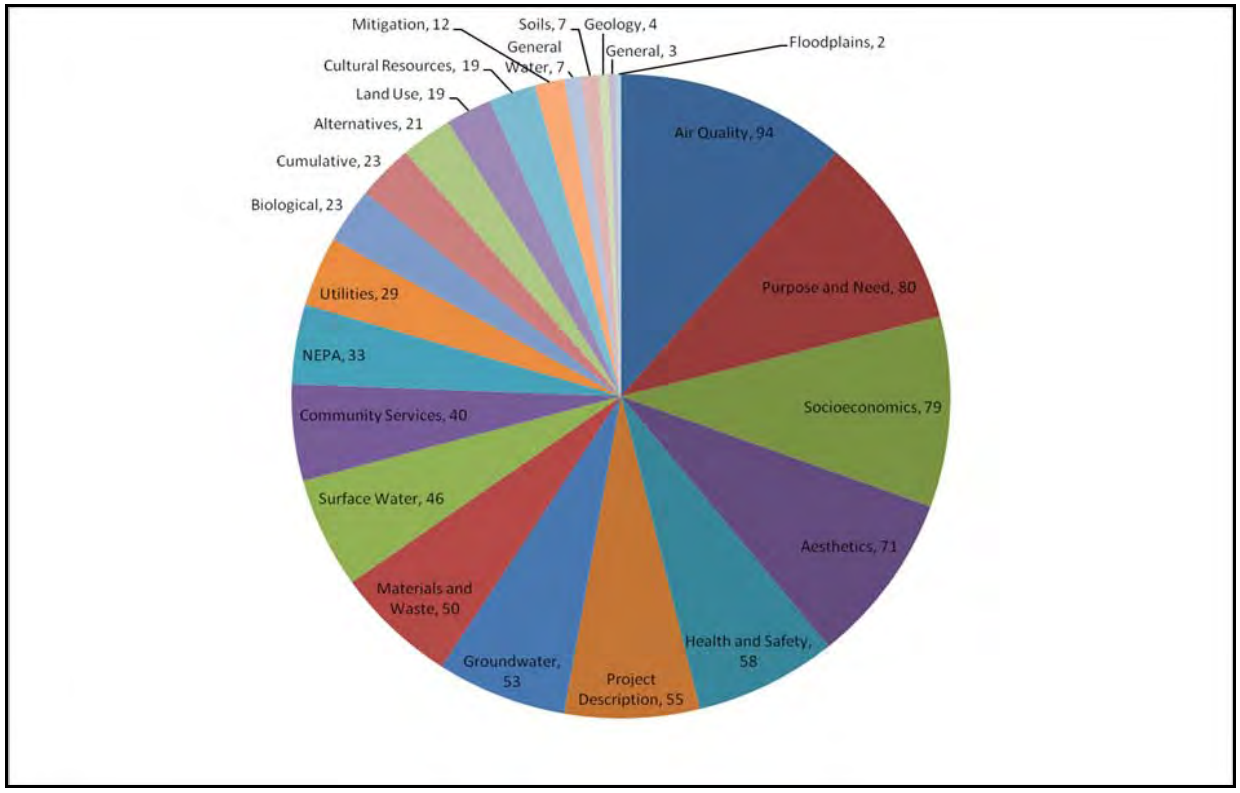


**Figure 1-3. Distribution of Scoping Comments by Subject Matter**

Table 1.4-1 provides a summary of scoping comments received and identifies the respective sections within the EA where the comments were taken into consideration. Overall, the majority of comments stated support or opposition to the Pilot Plant. Other comments consisted of questions about the Pilot Plant, with most questions relating to the steam hydrogasification process. Still other comments expressed concern about financial responsibility by Viresco, as well as preference for taxpayer money to go towards wind and solar technology. The scoping comments identified the following resource areas as chief concerns that should be addressed in the EA:

- Air Quality;
- Socioeconomics.
- Aesthetics;
- Public Health and Safety;
- Groundwater;
- Materials and Waste;
- Surface Water;
- Community Services; and
- Utilities.

**Table 1.4-1. Summary of all Scoping Comments Received**

| |
|---|
| **NEPA -** Several citizens argued that the project should be analyzed in an EIS rather than an EA; many are also opposed to the project. Others expressed dissatisfaction with the local zoning process and argued that it should be re-conducted with more transparency. Comments expressed concerns about local politicians and religious leaders not listening to public interests. |
| **Purpose and Need** – Comments included questions about milestones, the NEPA process, funding activities, funding information, political influence (local and national), rental price for the property, and preference for taxpayer money to go towards wind or solar technology. **Section 1.2.** |
| **Project Description and Alternatives** –Commenters expressed concerns regarding: plans for the facility once testing is complete, gasifier repair costs and timelines, questions about whether the City of Kanab will have any financial responsibility for cleanup if Viresco abandons the project site. Several people compared the project to a failed/abandoned plant outside of Fredonia, and several would prefer that the EA consider another location. **Section 2.3.** |
| **Traffic and Transportation** – Comments included concerns about coal traffic leaving Alton mine and travelling through small towns, and noise from trucks going to the project site. **Chapter 2.7.3.** |
| **Surface Water** – Comments included concerns about water pollution, released toxins (benzene, toluene, and xylene), unexpected releases, and effects to Kanab Creek and the reservoir under construction. Some questioned who will monitor the impacts to surface water. **Section 2.7.4.** |
| **Vegetation and Wildlife** – Comments included concerns about endangered species and critical habitat, wildlife, avian species, livestock, fish and birds. **Section 2.7.5.** |
| **Land Use** – Comments included concerns that the project would be located adjacent to the reservoir under construction, land use violations, and an increase in industrial use in area. **Section 3.1.** |
| **Aesthetics** – Comments included concerns about odors, noise, visuals, light pollution, proximity to National Parks. **Section 3.2.** |
| **Geology and Soils** – Comments included concerns about petrified wood and ancient rocks. Others are concerned about soil contamination and have questions on how the levels of contamination would be measured. **Section 3.3.** |

**Table 1.4-1. Summary of all Scoping Comments Received**

| |
|---|
| **Cultural Resources** – The Kaibab Band of Paiute Indians expressed substantial concerns about the project, the potential for effects on tribal artifacts and human remains that may be located on the site, and the lack of appropriate government-to-government consultation by DOE. Comments included concerns that the Kaibab Band was not appropriately notified. Others are concerned about local archaeological finds, and possible destruction of other artifacts. The Hopi tribe requested to be kept informed of project progress. The Utah SHPO concurred with DOE on the determination of no effect on historic properties. **Section 3.4.** |
| **Air Quality** – Comments included concerns about particulate matter, mercury, smog, toxins, preserving fresh air and clean skies, impacts to asthma, and effects from temperature inversions, contamination, and pollution. Some asked about pollution control equipment and who would inspect the plant; others made comparisons to residential wood burning practices. Commenters wanted to know if they'll be downwind of the project. **Section 3.5.** |
| **Groundwater** – Comments included concerns about groundwater pollution and toxins, especially from plant discharges and the sewage ponds. Questions about whether the ponds would be single- or double-lined. Citizens are concerned about who will monitor groundwater quality and about contamination from Kanab sewer ponds. **Section 3.6.** |
| **Materials and Waste** – Comments included concerns about spills and cleanup, spent ash, fuels to be stored at plant, source of coal, solid toxic waste (i.e., mercury, lead, arsenic), waste disposal (both amount and frequency), storage of feedstocks. Some individuals are also concerned about oversight of waste disposal. **Section 3.7.** |
| **Utilities** – Comments included concerns about the pipeline along US 89A that would bring a large amount of "culinary grade" water to project. **Section 3.8.** |
| **Public Health and Safety** – Comments included concerns about toxins, mercury levels, respiratory illnesses, risk of fire and explosions, violation of health standards, and potential for evacuation of prison or city. Some commenters questioned whether Viresco would be responsible to pay for emergency response or health risks to the public. Citizens are concerned about staffing at hospital and fire department in case of project-related emergencies. Concerned about lack of HAZMAT facilities close by. Concerned that City of Kanab would need to create a cleanup bond. **Section 3.9.** |
| **Socioeconomics and Environmental Justice** – Comments included concerns that local economy would be hurt because of adverse effects on tourism and the attraction of retirees. Others are concerned about real estate values and local jobs. Questions were raised about an economic impact analysis, and infrastructure costs to Kanab and Kane County. Comments included concerns that location was picked because it is a low income area, or that it doesn't have the environmental controls of NJ, TX or CA. **Section 3.10.** |
| **Cumulative -** Comments included concerns about cumulative effect of toxins, creation of additional unnecessary development (plant near Kane County Public Safety Facility and Jackson Flat Reservoir), coal mining in Alton, UT and its effects on noise, air and traffic. **Section 4.2.** |
| **General -** Comments included concerns that there are no Inspection plans or Quality Assurance Plans released to public for review. Provided a link to Kanab Cares website. |

In general, most resource areas were commented on in a substantive manner during the public scoping period. Resource areas that received less attention in the scoping comments included: Wetlands and Floodplains, Noise, Vegetation and Wildlife, Land Use, Geology and Soils. Although these resource areas received limited attention from the public, the EA nevertheless addresses potential impacts to all resources potentially affected by the project.

# 2.0 PROPOSED ACTION AND ALTERNATIVES

## 2.1 Introduction

This chapter describes the Proposed Action and No Action Alternative analyzed in this EA. As described in Chapter 1, CEQ's regulations direct all Federal agencies to use the NEPA process to identify and assess the reasonable alternatives to proposed actions that would avoid or minimize adverse effects of these actions upon the quality of the human environment (40 CFR 1500.2(e)).

## 2.2 Proposed Action

Under the Proposed Action, DOE would provide financial assistance, pursuant to a Congressional earmark to Viresco for construction and operation of a Coal and Biomass Fueled Pilot Plant that would convert carbonaceous feedstocks such as coal and lignocellulosic biomass into synthesis gas suitable for further processing (i.e. downstream processes) to liquid fuel or to substitute natural gas. It is important to note that, because the Pilot Plant would operate on an intermittent basis (i.e. test runs), there are no plans to utilize the resulting synthesis gas for sale or for downstream processes. The synthesis gas produced as a result of the testing would be combusted properly in a flare system. No fuel products or electricity would be produced as a result of the proposed project.

The project would be located in Kanab, Utah on land that is administered by the State of Utah, School & Institutional Trust Lands Administration (SITLA). The proposed site is 1.5 acres of a 10-acre parcel to be leased by Viresco. To date, this lease has been negotiated but not officially signed. The successful operation of this SHR gasification technology at the planned scale would achieve the goal of acquiring engineering information to develop a future commercialization pathway for this gasification process to produce liquid/gaseous fuels, and/or electric power from domestic resources such as coal and biomass. Viresco has no plans to commercialize the proposed Pilot Plant at the Kanab site in the future; it would remain a research and development facility.

## 2.3 Alternatives

DOE's Proposed Action is limited to providing financial assistance to Viresco in a cost-sharing arrangement to meet the requirements of a Congressional earmark in Fiscal Year 2010 Appropriation Act and its accompanying conference report. Therefore, DOE's decision subject to NEPA is limited to either accepting or rejecting the project as proposed by the proponent and specified by Congress, including its proposed technology and selected site. DOE's consideration of reasonable alternatives in this case is therefore limited to the Proposed Action and the No Action Alternative.

## 2.4 No Action Alternative

The No Action Alternative is required under Section 1502.14(d) of NEPA and DOE implementing regulations (40 CFR 1021.321(c)). A No Action Alternative is considered in this EA and provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of the Proposed Action. Under the No Action Alternative, DOE would not provide funding for the construction and operation of the Pilot Plant. To create the basis for a meaningful analysis, it is assumed under the No Action Alternative that the proposed project would not be undertaken, no construction or operations of the Pilot Plant would ensue at the proposed site, no other alternative at the proposed site would be implemented, and the proposed site would remain unchanged. It is possible that Viresco could construct the Pilot Plant or pursue another use for the proposed site using other funds independent of DOE. However, this scenario is unlikely as DOE funding is a critical component of this project and the project would likely not go forward without DOE's financial support.

## 2.5 Description of the Proposed Project

### 2.5.1 Primary Tasks and Goals

This Congressionally directed project would initiate evaluation of the SHR process at pilot scale. As discussed in Section 1.2, Viresco has been conducting research and development for several years on an innovative gasification technology concept that utilizes SHR to produce liquid fuels from coal and/or other carbonaceous

materials (e.g., biomass). Building upon their prior laboratory-scale research and development, Viresco intends to design, build, and operate a pilot-scale steam hydrogasification facility capable of converting 5 tons per day (tpd) of feedstock into a clean, high-energy content product gas suitable for downstream production of electricity or a number of fuels, including Fischer-Tropsch diesel, jet fuel, dimethyl ether, and methane.

The SHR process incorporates a fluid bed gasifier, fluidized by steam and recycled hydrogen with sand as the primary bed material. A heat carrier is connected by a standpipe and return line to a fluid bed regenerator (combustor) that heats the sand using char carbon and air. The SHR process offers several advantages over conventional air- or oxygen-blown gasification processes. For example, oxygen is not required to gasify the coal thereby eliminating the need for costly air separation units; the process uses wet feedstock, which has the advantage of eliminating energy-intensive drying steps used in other thermo-chemical conversion processes; and waste streams can be used as feedstock.

The following major tasks would be undertaken for the construction of the Pilot Plant:

- Design, construct, and commission a SHR gasifier to process incoming slurry of coal or coal-biomass blended material. Coal or coal-biomass pyrolysis and steam gasification would occur in this vessel. During this process the carbonaceous feedstock is converted into high energy content syngas (primarily methane, hydrogen, carbon monoxide, and carbon dioxide).

> ***Pyrolysis*** *is a thermochemical decomposition of organic material at elevated temperatures in the absence of oxygen. Pyrolysis typically occurs under pressure and at operating temperatures above 430 °C (800 °F).*

- Design, construct, and commission a fluidized bed regenerator (combustor) which would recover and return heat to the hydrogasifier. The SHR would be coupled to the fluidized bed regenerator.
- Design and install the coal biomass fuel feed system. This system would consist of slurry mixers, slurry pumps, and storage bins. Coal would be delivered to the site pre-ground, although Viresco is considering adding coal grinding for future operations (see Section 2.8 Consideration of Connected Actions).
- Design and install the syngas flare.
- Design and install the process instrumentation and control system. The plant would be operated using both a computerized performance reporting and documentation system and manual daily logs to ensure that monitoring and other management activities are performed correctly.
- Interconnect the proposed Pilot Plant with existing utility systems, including potable (i.e., culinary or drinking) water and sewer to be supplied by the City of Kanab, electricity to be supplied by Garkane Energy, and communications to be provided by South Central Communications. As natural gas is not available at the site, propane would be purchased from Garkane Energy and would be stored on site.
- Design and construct a building to house the laboratory space, office space, machine shop and storage area.

The goal of primary testing would include operations to determine:

- The thermal and mass balance of the system
- The carbon conversion efficiency and the thermal efficiency of the system
- Conditions required to sustain gasification with a minimum steam input to the reactor;
- Conditions required to maintain the heated fluidized bed regenerator;
- The impact of steam input rates and steam/carbon ratios on the steam hydrogasification of coal including determining syngas composition and carbon conversion within the hydrogasifier; and
- The fate of coal impurities.

### 2.5.2 Project Site

The project would be located at: Sec 10, T44S, R6W, Salt Lake base and meridian, SW4NW4NW4, Section 10, in southern Utah's, Kane County, near the Arizona border. The Vermillion Cliffs are located to the north of the site and Shinarump Cliffs are located to the south. The land is administered by SITLA. The proposed 1.5-acre site (Figure 2-1) is part of a 10-acre parcel to be leased by Viresco located approximately 2.5 miles south of the center of the City of Kanab in Kane County, Utah. As previously mentioned the terms and conditions of the lease have been negotiated but not yet signed.

The site is accessible from US 89A by a gravel road (Kaneplex Road) which leads to the Kaneplex Rodeo and Kane County Landfill. Figure 2-2 shows the location of the proposed site at the intersection of Old Landfill Road and Kaneplex Road and its immediate surrounding site features. The proposed project site is an existing undeveloped lot that currently consists of shrubs and grassland. The surrounding region generally consists of shrub/scrub, grasslands, and pasture landcover. Approximately 0.25 mile north of the site, construction has commenced for the Jackson Flat Water Supply Storage Project, which would consist of the construction of a dam embankment, water supply pipeline, water storage area (i.e. reservoir), and pump station. The closest residential property is located approximately 1.1 miles northwest of the site on S. Hopi Drive.

**Figure 2-1. Proposed Pilot Plant Site (looking Northwest)**

### 2.5.3 Site Layout of the Proposed Pilot Plant

Figure 2-2 is an aerial photograph showing a conceptual overlay of the Pilot Plant. Figure 2-3 is a conceptual drawing of the Pilot Plant. Note that connections to existing utilities (i.e. potable water, sewer, electricity, and communications) would generally be contained within and located along the northern boundary of the project site (Kaneplex Road). Equipment, processes, and utilities are discussed in more detail in Section 2.5.2.

## 2.6 Construction

Construction of the Pilot Plant would take approximately 4 months beginning in late 2011. It is estimated that up to 30 construction workers would be required at the site at any given time. Construction activities would include site clearing and preparation; build-out of support areas and buildings; installation of equipment for process

systems; and final systems check. A National Pollutant Discharge Elimination System (NPDES) permit would be required as there would be more than one acre of disturbance. Specific stormwater control best management practices (BMPs) would be developed during final site design and could include BMPs such as temporarily seeding bare soil areas with appropriate native vegetation to reduce onsite soil erosion. Construction of the Pilot Plant would occur in the following sequence:

- Site clearing, installing the stormwater drainage system, setting the final elevation of the site, installing the gravel for the roads and parking lot, and installing the perimeter fence.
- The manufacturing, assembly, and installation of the SHR gasifier, fluidized bed regenerator and associated infrastructure (i.e. coal biomass fuel feed system, syngas flare).
- Construction of the laboratory building (which would include offices, a laboratory, a storage area, and machine shop) and support structure (which would house the steam-generating boiler). Installation of the utilities including the electrical system, potable water, sewer, and communications.
- Performing a final installation check for all systems. This would consist of operating all equipment in the system. Each system component would be checked individually as they are assembled and installed. The process instrumentation and control system would be checked for proper operation according to the design specifications.
- Performing "shakedown runs" at the Pilot Plant to bring all equipment online after final installation checks. Once this is complete, the Pilot Plant would enter operational mode.

## 2.7 Operation

Operation of the Pilot Plant would be expected to commence during the spring of 2012. The Pilot Plant operations under the cooperative agreement with DOE would be limited by funds available and would be expected to total up to 30 days. These operations would focus on optimizing the functionality of the individual and integrated equipment components. The plant would not be operated for 30 continuous days but would operate during three or four testing periods; typical test periods are expected to last an average of five to twenty days each. Plant personnel would provide the daily management and monitoring of quality, performance, and health and safety of workers during periods of testing and would perform maintenance and service responsibilities as needed. Approximately 9 employees would be required for the operation of the Pilot Plant. Table 2-1 summarizes the feedstock, materials, and waste streams that would result from operation of the Pilot Plant. The following sections discuss these components in greater detail.

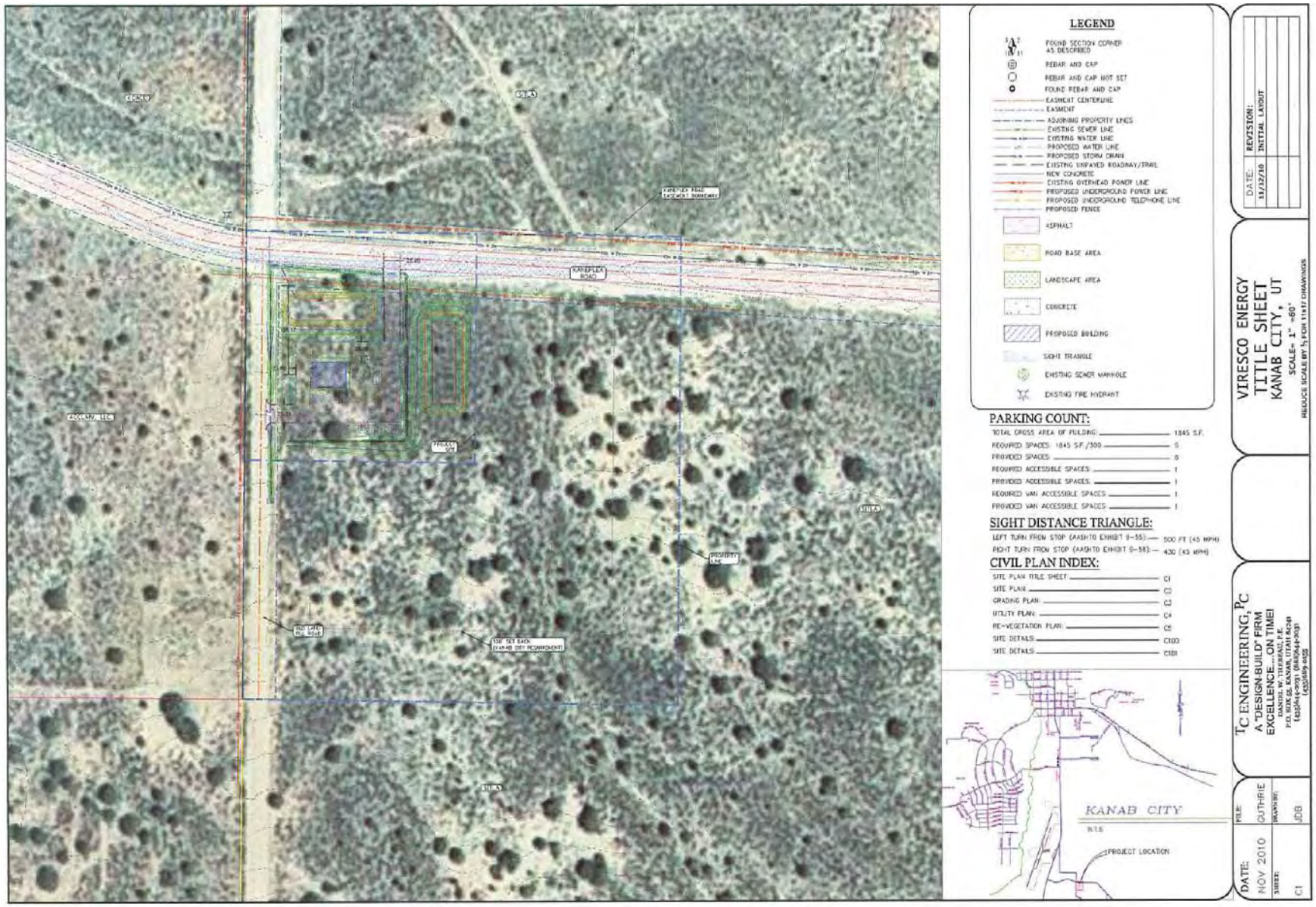


**Figure 2-2. Project Location Map**

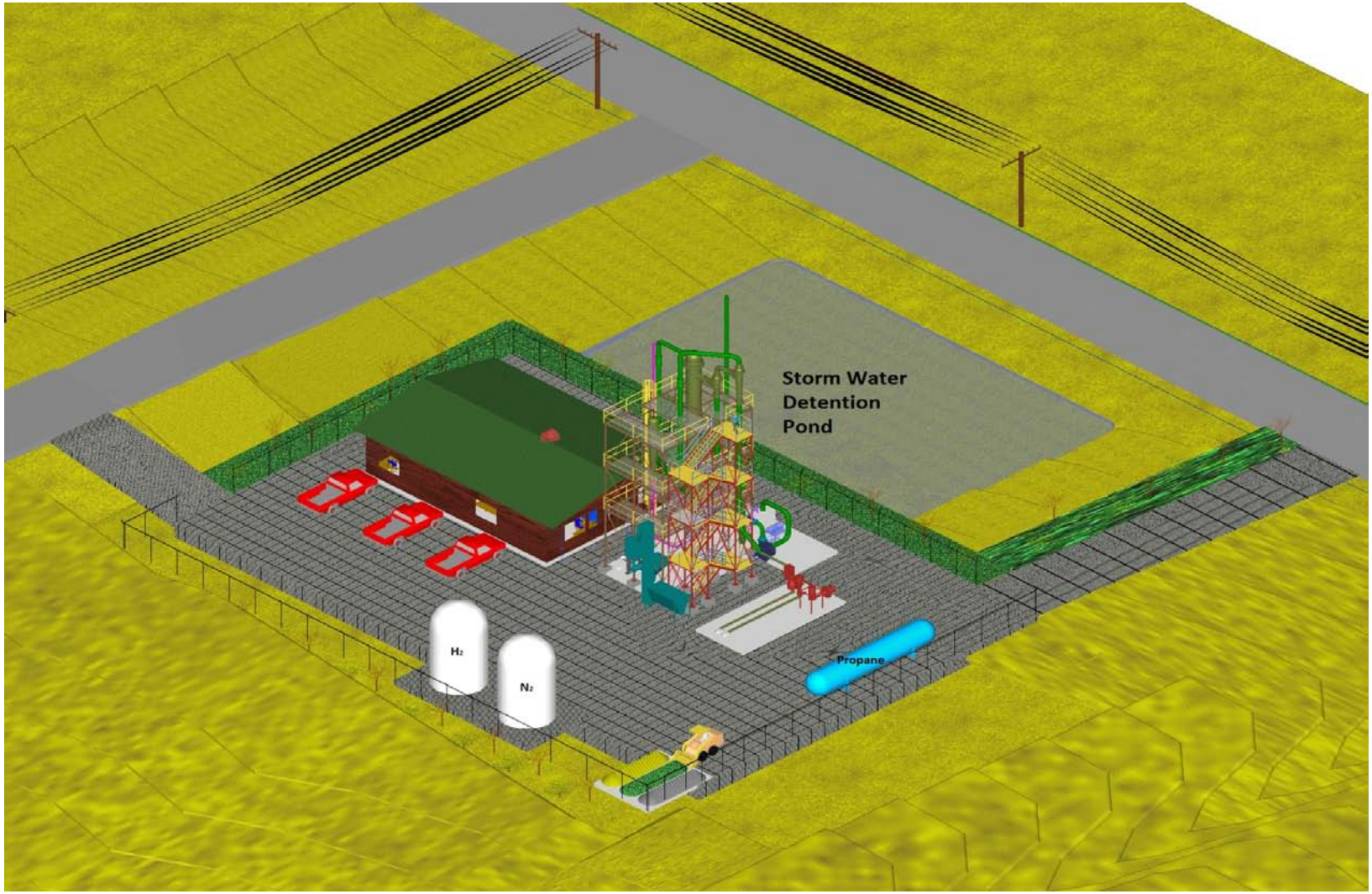


**Figure 2-3. Conceptual Drawing of Pilot Plant**

**Table 2.5-1. Feedstock, Materials, and Waste Streams**

| Item | Description |
|---|---|
| *Feedstock and Material – Quantity and Source* | |
| Coal | 5 tons per day, 150 tons for 30 days of operation; transported by truck |
| Lignocellulosic Biomass | The percentage of biomass in the feed to be decided later; however, it's anticipated to be 10 to 50 percent in weight. |
| Process Water | 1,270 gallons per day (gpd), supplied by the City of Kanab |
| Sand | Up to 300 tons, for 30 days of operation, transported by truck. |
| Propane | 660 gpd, purchased from Garkane Energy |
| Hydrogen | 49 pounds per hour (lbs/hr) |
| Electricity | 225 kilowatts (kW); supplied by Garkane Energy |
| Potable water | 250 gpd; supplied by the City of Kanab |
| ***Products and Wastes – Quantity and Method of Treatment*** | |
| Process Wastewater | Total of 2,200 gpd, majority would exit the system as steam and the remaining would be recycled within the process |
| Sanitary Wastewater | Sanitary/gray water 250 gpd, collected by the City of Kanab |
| Solid Waste | 1,166 pounds of ash per day, Total of 26 tons including fines for 30 days of testing. Would be collected, analyzed, and disposed of in an appropriate landfill. |
| Air emissions | Most notable emission would be carbon monoxide and is estimated to be less than 4 tons for the 30 days of operation. |

### 2.7.1 Materials Required

The primary required feedstocks would include coal and biomass. The proposed Pilot Plant would utilize a maximum of 5 tons of coal per day for testing. The Pilot Plant would use sub-bituminous or lignite coal and Viresco would store up to 40 tons of the coal on site for testing. Overall it is anticipated that approximately 150 tons of coal would be required for 30 days of testing. The coal would be obtained from commercial sources and transported to the site via trucks; it is anticipated that there would be a total of 4 truck deliveries for the 30 days of operation under the cooperative agreement with DOE. Viresco plans to test one coal-biomass mixture during the DOE cooperative agreement, after the initial testing is completed with coal. The percentage of biomass to be used in the feed would be decided later; however, it is likely to be 10 to 50 percent by weight.

The SHR gasifier and the regenerator would use less than 300 tons of sand for the 30 days of operation. Unlike the feedstock, the sand is not consumable and therefore, would not need to be supplied regularly. The maximum amount of sand to be stored on site would be 350 tons. The sand would be obtained from commercial sources and transported to the site via trucks; it is anticipated that there would be a total of 10 truck deliveries of sand throughout the period of 30 days of operation.

Process water would be required at a rate of 1,270 gpd for a total of 38,100 gallons for 30 days of operation. The daily potable water demand by the Pilot Plant when it is operational would be limited to the needs of a workforce of 9 employees at 250 gpd for a total of 7,500 gallons for 30 days of operation. Both the process water and the potable water would be supplied by the City of Kanab's potable water system. The total daily rate of potable water use (1,520 gpd) represents 0.03 percent of the existing wells and spring capacity that supply the City of Kanab's potable water system.

Natural gas is not available at the site; therefore propane would be used as fuel for the boiler and regenerator. Propane would be purchased from Garkane Energy and transported to the site via truck. The propane would be stored on site in a 6,000 gallon tank. It is expected that the 6,000 gallons of propane would be able to sustain 9 days of testing as the Pilot Plant would use 660 gpd of propane. Therefore, it is anticipated that there would be a total of 4 truck trips for the period of 30 days of operation delivering propane to the site.

Electric power would be supplied by Garkane Energy. The preliminary estimated power demand is 225 kW.

### 2.7.2 Facility Processes and Equipment

This section describes operations at the Pilot Plant in the context of the processes involved and associated facilities and equipment. The Pilot Plant operations under the cooperative agreement with DOE would be limited by funds available. These operations would focus on optimizing the functionality of the individual and integrated equipment components. During the period of the cooperative agreement with DOE the Pilot Plant would operate for a total of 30 days and it is expected approximately nine employees would be required for operation of the Pilot Plant. Plant personnel would provide daily management and monitoring of quality, performance, and health and safety of workers and would perform maintenance and service activities. The Pilot Plant would consist of the following processes and equipment as illustrated in Figure 2-4:

***Laboratory Building and Support Structure***

The proposed Pilot Plant would include the construction of a laboratory building and support structure. The laboratory building would include offices, a laboratory and a storage area. The laboratory building would also house the computerized process instrumentation and control system for operation and data acquisition. Manual daily logs would also be maintained and stored here. The support structure would support the main gasifier and regenerator vessels. Ancillary equipment such as the steam boiler, slurry prep and air compressor are designed to be on small skid modules. The skid modules would consist of the aforementioned items built offsite and mounted on a heavy-duty structural steel frame base with grated working platforms and delivered to the site fully constructed. The skids would be equipped with all the necessary ancillaries required for operation. This allows any construction schedule to be compressed as less "onsite" fabrication would be needed.

***Feedstocks to the Steam Hydrogasification Reactor***

For the SHR gasifier to work it would need to be provided certain feedstocks consisting of hydrogen, steam, and a coal or coal and biomass slurry. Hydrogen would be generated offsite, trucked to the site and stored in a liquid hydrogen container. Hydrogen from tube trailers or liquid hydrogen bottles would be used for the hydrogen supply to the gasifier. The hydrogen would be heated to approximately 324 degrees C for feed to the gasifier at approximately 49 pounds per hour (lb/hr) feed rate. Steam generation would be created by adding potable water to the boiler. A steam generator would be included that can superheat steam to 724 degrees C for delivery at a rate of approximately 594 lbs/hr to the gasifier. Finally, the coal biomass fuel feed would consist of coal slurry mixers, slurry pumps, and storage bins. Five dry tons per day of coal or a mixture of coal and biomass would be mixed with potable water to create a slurry which would then be sent to the gasifier.

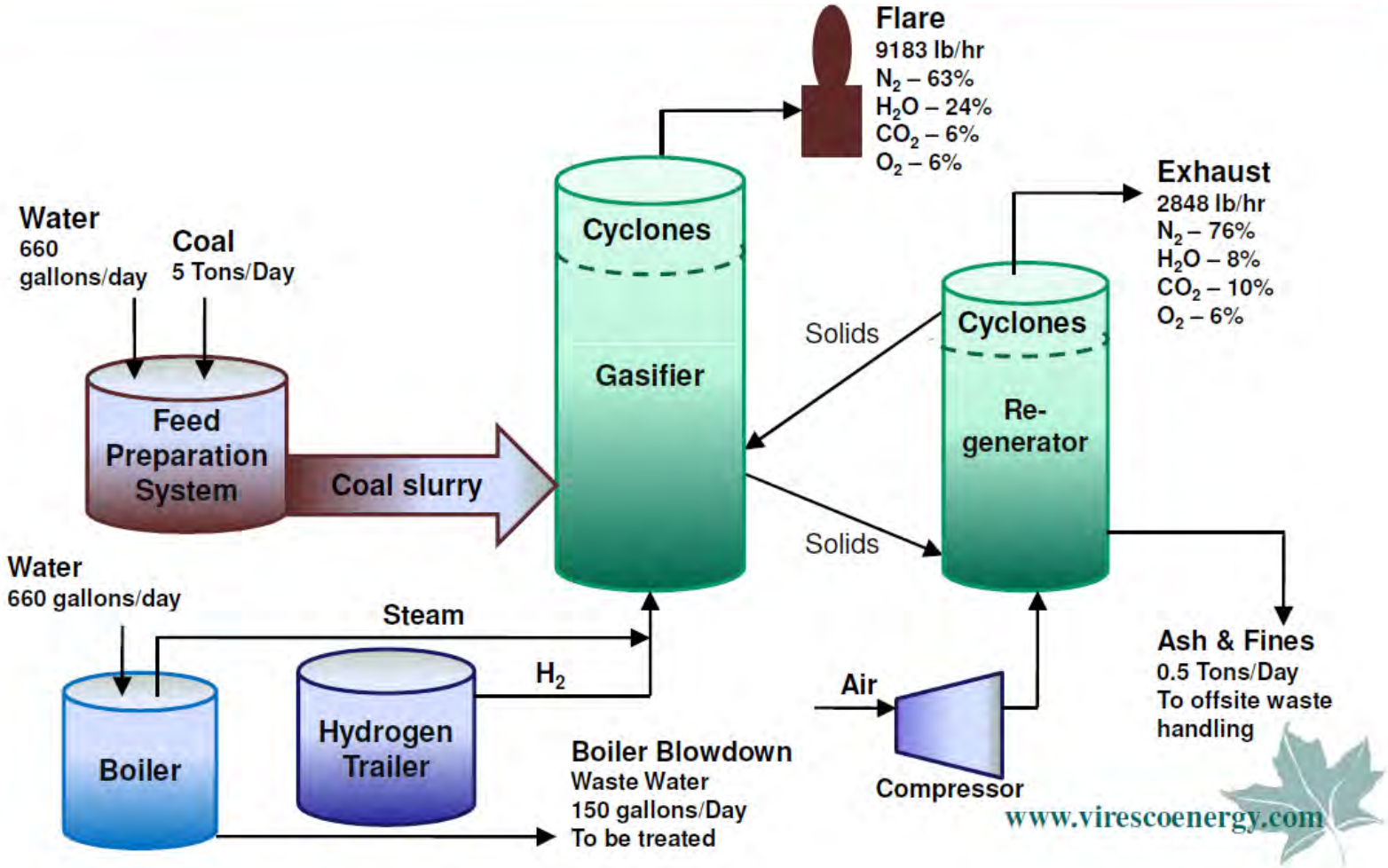


**Figure 2-4. Utah Coal and Biomass Fueled Pilot Plant Processes**

***Steam Hydrogasification Reactor***

Once all of the feedstocks are sent to the gasifier the steam hydrogasification reaction is ready to take place. The gasifier would be coupled to the fluidized bed regenerator (discussed in more detail below). Coal or coal-biomass pyrolysis and steam gasification would occur in the gasifier. The Steam hydrogasification process uses both steam and hydrogen to affect the reaction. The process takes a feed of carbonaceous material and, under high temperature and pressure, converts it into gases predominantly consisting of methane, carbon monoxide and hydrogen by the following primary reactions:

$$C + 2H_2 \rightarrow CH_4$$

$$C + H_2O \rightarrow CO + H_2$$

$$CO + H_2O \rightarrow CO_2 + H_2$$

$$CO + 3H_2 \rightarrow CH_4 + H_2O$$

During pyrolysis, volatiles are released from the feedstock as a gas containing primarily hydrogen, methane, steam and some higher hydrocarbons as oils or tars. Within the same vessel the solid char, which remains after the initial pyrolysis, undergoes the steam hydrogasification reactions to generate syngas containing carbon monoxide, methane, carbon dioxide and hydrogen.

***Fluidized Bed Regenerator***

The fluidized bed regenerator coupled to the SHR gasifier would recover and return heat to the SHR gasifier. The fluidizing medium within the regenerator is sand. The sand would be heated by the energy generated through the combustion of unreacted char from the SHR gasifier and additional fuel (propane) The hot sand would then be recirculated back to the SHR gasifier. Unconverted char and some of the ash product would flow from the gasifier to the regenerator along with the circulating sand. The char would be combusted in the regenerator along with added propane fuel to provide heat for the process. The hot sand would be separated from the ash, and the sand circulated back to the SHR gasifier.

***Syngas Flare and Removal of Ash and Fines***

Ash and fines produced as a result of the steam hydrogasification reaction would be separated from the gaseous products and sand from the reactor and regenerator using cyclone separators. Ash would be received in a hopper after cooling. The ash and fines would be collected, analyzed, and disposed of in an appropriate landfill. Wastewater, which is generated as blowdown from the boiler feedwater, would be collected and reused within the process. Process gases from the hydrogasifier would be sent to the flare, and no condensation of process water is expected during normal operation. The product gas from the gasifier would also be flared in the flare stack.

### 2.7.3 Products and Waste Generated

Based on a sub-bituminous coal feedstock, the Pilot Plant would produce 1,166 pounds of ash during each day of testing. The ash would be removed from the process continuously using cyclone separators to separate it from the process gases, and from the sand. The total ash produced during 30 days of testing would be around 17 tons (26 tons including estimated fines). The ash would be collected, analyzed, and disposed of in an appropriate landfill.

The maximum process wastewater produced during testing would be 2,200 gpd. The maximum process wastewater to be produced over the course of 30 days of operation would be less than 66,000 gallons. Process gases from the hydrogasifier would be sent to the flare hot, and no condensation of process water is expected during normal operation. The process wastewater would be retained onsite and re-used within the process.

The Pilot Plant would be considered a minor source of air emissions. As a minor emitter for air pollutants the project would qualify for an exemption from a full air emissions permit as a small source under regulations enforced by the Utah Department of Environmental Quality (UDEQ), Division of Air Quality (DAQ), which is the state environmental agency responsible for issuing air permits. Notably, emissions would be made up almost entirely of typical combustion gas components (nitrogen, oxygen, carbon dioxide, and water vapor) with small amounts of, criteria pollutants (i.e. non-hazardous) and a minute amount of uncombusted hydrogen. With regard to hazardous air pollutants (HAPs), high molecular weight organic compounds, radionuclides or toxic metals would not be expected in quantities that would pose a health hazard, based on the combustion efficiency of the flare and the small concentrations of metals and radionuclides in the feedstock to the gasifiers. GHG emissions would be approximately 543 tons of $CO_2$ for the 30 days of operation. This is equivalent to annual GHG emissions from 96 passenger vehicles, or the electricity use of 60 homes for one year (USEPA, 2011a).

Sanitary wastewater would be generated by the employees of the Pilot Plant at a rate of approximately 7,500 gallons for the 30 days of operation based on a standard rate of 28 gallons per employee per day. The wastewater would be disposed of through the local public sanitary sewer system via an existing pipeline located along Kaneplex Road. The City of Kanab's existing sewer system would have the capacity to meet this demand without the need for upgrades. This total daily rate represents 0.07 percent capacity of the two wastewater lagoons currently utilized by the City of Kanab.

### 2.7.4 Benefits of Pilot Plant Systems

Hydrogasification does not require an oxygen plant, which can be a substantial cost to a gasification facility. The addition of steam to hydrogasification significantly increases reaction rates, which lowers residence times allowing for, amongst other things, smaller reactors. Since the feedstock would be gasified with water (steam), it does not need to be dried beforehand and could potentially be fed as a slurry. Although steam hydrogasification has been studied only recently, it appears to be compatible with all the typical gasification feedstocks, from coal to renewable sources like wood, agriculture residues, green wastes, municipal solid wastes, food and animal waste, and sewage sludge.

### 2.7.5 Decomissioning

This project would be located in Kanab, Utah on land that is administered by the state of Utah SITLA. The proposed 1.5-acre site is part of a 10-acre parcel to be leased by Viresco for a term of 30 years. The terms and conditions of this lease have been negotiated but not yet signed. As per the negotiated terms and conditions of this lease, Viresco would be responsible for properly removing structures, equipment and debris, restoring the land to the original contour, and revegetating the land as necessary upon termination of the lease. The revegetation of the land would prevent soil erosion, ensure the establishment of native vegetative species, and control noxious weeds and pests (SITLA, Undated).

### 2.7.6 Permits, Regulations, and Applicant Committed Measures

Table 2.5-2 summarizes permits and agency approvals, potentially applicable regulations, and Viresco-committed measures for the proposed project.

**Table 2.5-2. Permits and Approvals Needed Prior to Project Implementation**

| Material, Use, or Resource | Type of Approval | Agency/Entity | Requirements/Applicant Committed Measures |
|---|---|---|---|
| EA | FONSI or ROD | DOE/NETL | |
| Threatened and Endangered Species | Determination of no Adverse Effect | USFWS and UDNR | DOE submitted consultation letters to the Utah regional office of USFWS and to UDNR.<br>The consultation letters are presented in Appendix A. |
| Section 106, historical/archeological | | SHPO | Section 106 of the NHPA requires Federal agencies to take into account the effects that their Federally funded activities and programs have on significant historic properties. "Significant historic properties" are those properties that are included in, or eligible for, the National Register of Historic Places (NRHP). The National Register is administered by the National Park Service in conjunction with the state historic preservation offices (SHPOs). If potentially significant cultural artifacts are exposed by trenching or below-grade excavation during construction, Viresco would ensure that construction activity would cease within an appropriate radius (no less than 100 feet from discovery) until an archaeologist qualified under 36 CFR Part 61 could examine the artifacts and the SHPO was notified. |
| Air Emissions | Small Source Air Emissions Permit | UDEQ, DAQ | As a minor emitter for air pollutants the project would qualify for an exemption from a full air permit as a small source under regulations enforced by the UDEQ, DAQ. |
| Air Emissions | General Conformity | UDEQ, DAQ | A General Conformity Rule – Section 176(c) of the Clean Air Act (CAA) (42 U.S.C. 7506(c)) – requires Federal agencies to perform conformity reviews to demonstrate that their actions do not impede State Implementation Plans (SIPs), plans that discuss local efforts to control air pollution. Because the Proposed Action would be sponsored and supported by DOE, the project must therefore be reviewed for general conformity. The potential air emissions from the project would be well below conformity threshold value established in 40 CFR 93.153(b). DOE determined that the project would be acceptable with respect to the General Conformity Rule and that a full conformity analysis would not be required for either site option (see Section 3.5, Air Quality). |
| Stormwater | Construction NPDES Permit | UDEQ, Water Quality Division | For construction of the Pilot Plant Viresco would file for authorization via UDEQ's construction General Permit to obtain stormwater management coverage and would adhere to NPDES regulations as required under this permit. |

## 2.8 Consideration of Connected Actions

This EA addresses the impacts of DOE's proposed action and Viresco's proposed project and any connected actions in accordance with NEPA (40 CFR 1508.25(a)1) regardless of the entity undertaking those actions. A connected action is one that is closely related to DOE's proposed action or Viresco's proposed project, including an action that automatically triggers another action which may require an EA or EIS; an action that cannot or would not proceed unless another action is taken previously or simultaneously; or an action that is an interdependent part of a larger action and depends on the larger action for its justification.

Under the cooperative agreement with DOE, Viresco would operate the Pilot Plant and collect data for a series of test runs totaling 30 days of operation over a period of months. After the DOE's financial assistance ends, Viresco plans to seek additional funding for continued operations. Viresco's plans for operating its facility after DOE's involvement ends are not well-defined and would depend on the objectives the provider of any additional funding sought to achieve. However, it is likely that any future operations would continue to test the gasification process in order to improve its operation and output to achieve high process efficiency. Viresco has informed DOE that it intends to operate its Pilot Plant for a maximum of 130 days during a calendar year if it is able to obtain financing. These additional operations would need to be approved by UDEQ if emissions from the plant were to exceed those allowable under the small source exemption.

This EA analyzes the possibility that Viresco may operate its facility for as many as 130 days annually after DOE's involvement ends as a connected action. The potential impacts of this connected action are described below.

Viresco would continue to manage the Pilot Plant and monitor its operations and impacts during any periods of testing after DOE's involvement ends. Table 2.7-3 summarizes the property features, feedstock, materials, and waste streams that Viresco anticipates would change if operations were extended. Items such as zoning, stack height, and support structures are not expected to change during any extended operations. Impacts due to continued operations of up to 130 days per year are addressed in each resource area in Chapter 3 as impacts attributable to this connected action.

After DOE's involvement ends, Viresco may consider other options for management of the process wastewater (e.g. storage in an evaporation pond for potential re-use). Depending upon the results of analysis, excess process wastewater could be discharged to the City sewer system or removed by commercial services for appropriate disposal. Potential impacts of this option for wastewater management are addressed as connected action impacts in Section 3.6, Groundwater, and Section 3.8, Utilities. Viresco does not intend to pursue any of these options during DOE's involvement.

In the future, Viresco may also consider adding some form of gas cleanup processing and hydrogen separation. The details regarding these additional processes are not available at this time and would depend upon the availability of funds from other sources and the objectives those sources sought to achieve with their funding. Therefore, potential impacts associated with these processes are not addressed in this EA, because they cannot be identified or analyzed at this time.

As already stated, electricity would be supplied by Garkane Energy. Viresco obtained a will-serve letter from Garkane Energy on August 8, 2011 (Appendix C) stating that Garkane Energy has the means to provide 225 kW of electricity to the proposed Pilot Plant. The letter explains that the provision of service would be contingent on easements, necessary system improvements, and a 3-phase 12.5 kV power line constructed to the site. The implementation of these improvements would be connected actions for the proposed project. DOE anticipates that the improvements and easements would occur in existing disturbed areas or adjacent to existing rights-of-way, which would result in minimal impacts.

**Table 2.7-3. Comparison of Proposed Project and Future Operations Components**

| Item | Proposed Project (maximum 30 days of operation) | Anticipated Future Operations (120 to 130 days of operation during a calendar year) |
|---|---|---|
| ***Property Features*** | | |
| Site Property | Proposed Project to take place on 1.5 acres of land, which is part of a 10-acre parcel to be leased by Viresco for 30 years. | Additional 0.2 acres estimated for additional equipment. |
| Impervious Land Coverage | Approximately 1 acre of impervious coverage. | Additional 0.2 acres estimated for additional equipment. |
| Hydrogen Supply System | Hydrogen generated offsite, trucked to site, and stored in a liquid hydrogen container. | A steam propane reformer may be installed. This would be used to produce hydrogen and carbon monoxide using propane and steam feeds. |
| Coal Biomass Fuel Feed | Would consist of coal slurry mixers, slurry pumps, storage bins. | Biomass and coal grinders, as well as a biomass slurry preparation system, would be added. |
| ***Feedstock and Material – Quantity and Source*** | | |
| Coal | 5 tpd, 150 tons for 30 days of operation; transported by truck. | 5 tpd, 650 tons for 130 days of operation, transported by truck. |
| Lignocellulosic Biomass | The percentage of biomass in the feed to be decided later however it's anticipated to be 10 to 50 percent by weight. | No change to percentage used; however, additional types of biomass may be tested. |
| Process Water | 1,270 gpd, supplied by the City of Kanab | 3,000 gpd, supplied by the City of Kanab |
| Sand | 10 tpd, transported by truck. Up to 300 tons for 30 days of operation. | 10 tpd, transported by truck. Up to 1,300 tons per year (tpy) for 130 days of operation. |
| Propane | 660 gpd, Up to 19,800 gallons for 30 days of operation, purchased from Garkane Energy. | 660 gpd, Up to 85,800 gallons for 130 days of operation, purchased from Garkane Energy |
| Electricity | 225 kW; supplied by Garkane Energy. | 265 kW; supplied by Garkane Energy |
| Potable water | 250 gpd; supplied by the City of Kanab. | No change as employee numbers would remain the same. |
| ***Products and Wastes – Quantity and Method of Treatment*** | | |
| Process Wastewater | Total of 2,200 gpd, majority would exit the system as steam and the remaining would be recycled within the process | Total of 3,000 gpd, majority would exit the system as steam and the remaining would be recycled within the process. |
| Sanitary Wastewater | Sanitary/gray water 250 gpd, discharged to the City of Kanab sanitary sewer system. | No change as employee numbers would remain the same. |
| Solid Waste | 1,166 pounds of ash per day, Total of 26 tons including fines for 30 days of testing. Would be collected, analyzed, and disposed of in an appropriate landfill | Total of 113 tons, including fines, for 130 days of testing. Would be collected, analyzed, and disposed of in an appropriate landfill |
| Air emissions | Most notable emission would be of carbon monoxide and is estimated to be less than 4 for the 30 days of operation.. | Most notable emission would be of carbon monoxide and is estimated to be less than 16 tons for 130 days of operation. |

All necessary permits for additional construction, air emissions, and process wastewater would be obtained from Federal, state, and local entities as needed before any changes are implemented at the proposed project site.

## 2.9 Resources not Considered in Detail

The following resources were determined to not be affected by the proposed project under any of the alternatives.

### 2.9.1 Wetlands and Floodplains

Based on National Wetland Inventory (NWI) mapping the proposed project site does not contain any wetland areas. Due to the natural arid climate and NWI results, as verified during a site visit, DOE decided that a wetlands determination was not needed and further analysis was not warranted. DOE also reviewed Flood Insurance Rate Maps (FIRM) as provided by the Federal Emergency Management Agency (FEMA) and determined that the project site is located outside of the 100- and 500-year floodplains and does not require further analysis.

### 2.9.2 Transportation and Traffic

Construction traffic would primarily be limited to the immediate vicinity of the project site that would last for approximately 4 months. During construction, the additional traffic from truck and construction worker vehicle trips to the site would be short term and easily accommodated within existing roadway and intersection capacity, such that only negligible impacts would occur.

The proposed site is located along Kaneplex Road which currently experiences a low volume of truck traffic related to deliveries to and returns from the Kane County Landfill. The existing local roadway network easily accommodates this volume. The proposed project would be expected to result in additional deliveries of approximately 14 truck visits per year that would use established truck routes currently in place. The additional truck trips to the site would also be easily accommodated within existing roadways and intersection capacity, therefore only negligible impacts would occur. The proposed project would generate a minor short-term increase in personal vehicle traffic due to the hiring of approximately 9 permanent employees. However, the Pilot Plant would not operate on a continuous basis during the year, therefore reducing the number of personal vehicles on roads and accessing the facility on a day to day basis. This small increase in employee vehicle traffic would have a negligible impact to the surrounding community.

### 2.9.3 Surface Water

The project site is located within the Utah portion of the Kanab Basin (HUC 15010003) which encompasses approximately 630 square miles of Kane County in southwest Utah and drains a total area of 2,350 square miles in Utah and Arizona. The Kanab Basin contains 93.7 miles of streams; however, Kanab Creek, Johnson Wash and Skutumpah Creek are considered the only significant perennial streams in the drainage basin. Kanab Creek, located approximately one mile west of the proposed project site, is a tributary to the Colorado River. It originates below the rim of the Paunsaugunt Plateau near Alton and flows 29.7 miles south to the Utah-Arizona state line. Kanab Creek and Johnson Wash are the only streams in the drainage basin that have been catalogued by the Utah Division of Wildlife Resources. There are no catalogued lakes or reservoirs in the drainage basin. (UDNR/DWR, 2007). Annual precipitation in the City of Kanab is 5 to 15 inches per year (USDA/NRCS 2005).

Section 303(d) of the CWA requires states to identify and develop a list of impaired waterbodies where technology-based and other required controls have not provided attainment of water quality standards. Section 305(b) of the CWA requires states to assess and report the quality of their waterbodies. Utah combined their 303(d) and 305(b) list into one report referred to as the Integrated Report. The report identifies those waterbodies that are impaired and do not meet designated uses, and it establishes total maximum daily loads for pollutants of concern. Based on the UDEQ, Water Quality Assessment 2010 Integrated Report, Kanab Creek and Johnson Wash are both considered impaired for total dissolved solids (UDEQ/DWQ, 2010).

There are no surface water features within the proposed project site; therefore, no potential exists for direct impacts to surface waters. As there would be over one acre of disturbance, and construction activities could cause erosion of sediments into adjacent surface water features located offsite, Viresco would obtain a NPDES General Permit to ensure compliance with the UDEQ, Division of Water Quality sediment and erosion controls. To minimize potential impacts to water resources a General Permit would require the preparation of a Stormwater

Pollution Prevention Plan (SWPPP). This plan includes BMPs for erosion control and pollution prevention requirements. Considering that the nearest natural surface water (Kanab Creek) is approximately one mile west of the site across US 89A and on the west side of the Kanab Airport, it is unlikely that any natural water bodies would be affected during construction. Overall, no impacts to surface waters would be expected. Best management practices would be installed and maintained during land-disturbing activities to further prevent the potential of indirect impacts to surface waters from construction site runoff.

Preliminary site designs for the proposed facility show structures for the detention of stormwater. These site designs have been approved by the City of Kanab as in compliance with their ordinances; thus, it is anticipated that adequate stormwater management would be included in the design and no impacts to natural surface waters would be expected from stormwater runoff.

No direct withdrawals from or process discharges to surface waters would be associated with the operation of the proposed project. During construction and once operational, Viresco would maintain a Spill Prevention, Control and Countermeasure (SPCC) Plan developed under Federal and state regulations for avoidance, minimization, and response to pollutant spills that could occur. The plan would include items such as the confirmation that Viresco's operations manual meets applicable regulations; description of Viresco's maintenance and inspection program relative to spill prevention and control; provisions to keep maintenance and inspection records current; procedures to contain and recover oil or hazardous substances spilled during onsite transfers; and training procedures for personnel regarding spill prevention and control. By implementing the SWPPP and the SPCC Plan, the potential for impacts from facility operations on surface waters would be negligible.

### 2.9.4 Vegetation and Wildlife

During the May, 2011, site visit, DOE determined that the proposed project is located within an arid environment that has limited vegetation resources and wildlife habitat existing within or directly adjacent to the study area. Vegetation in the area includes scattered juniper, low sagebrush, sand sagebrush, prickly pear and cholla cacti, yucca, and various bunch grasses and forbs (Figure 2-5). The site has been impacted by erosion, grazing, and recreational use of the area (Nash, Robert B., Dale R. Gourley, and Logan Hunt, 2010). No wildlife species were observed within the project site during the May 2011, site visit. Additionally, a site inspection was performed on April 4, 2010 for the Kane County Public Safety Facility Environmental Assessment which is located approximately 0.5 miles southeast of the site along Kaneplex Road. During that inspection no threatened, endangered, or candidate wildlife species were observed (USDOI/BLM, 2010). Therefore, only negligible impacts would be anticipated to terrestrial species from either construction or operations.

DOE sent informal coordination letters to both the USFWS and the UDNR, Division of Wildlife Resources to verify that the project would have no effect on any Federally or state-listed threatened, endangered, or candidate species, or critical habitat within the vicinity of the proposed project (see Appendix A). In a response dated January 3, 2011, the USFWS acknowledged concurrence with DOE's determination that the Proposed Action would not significantly affect any threatened or endangered species or their critical habitat.

In a letter dated July 6, 2011, the UDNR, Division of Wildlife Resources stated that it has no records of threatened, endangered, or sensitive species within the study area. UDNR noted that there are historical records of occurrence for bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk (*Buteo regalis*) and southwestern willow flycatcher (*Empidonax traillii extimus*) in the vicinity, all of which are included on the Utah Sensitive Species List. Bald eagles typically nest in larger trees close to coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, and seabirds. Ferruginous hawks may nest on the ground or in trees in a variety of habitat types. Juniper trees, which are found onsite, are often used as nest sites in Utah; however, ferruginous hawks typically utilize trees on the sides or summits of hills and avoid areas of intensive agriculture or high human disturbance (NatureServe, 2010). The southwestern willow flycatcher nests in relatively dense riparian tree and shrub communities associated with rivers, swamps, and other wetlands (USFWS, 2010). The only one of these species that could utilize onsite habitat is the ferruginous hawk; however, it is highly unlikely that any would nest onsite considering the site's proximity to human disturbances, particularly Kanab Municipal Airport, and no nest was observed during a site

visit in May 2011. Thus, no impacts to species listed on the Utah Sensitive Species List would be expected. As with impacts to Federally or state-listed threatened, endangered, or candidate species, no impacts would be anticipated to species of cultural significance from either construction or operations, including those plants and animals of concern to the Kaibab Band of the Paiute (see Appendix B for a list of culturally significant plants and animals submitted to the DOE by the Kaibab Band of Paiutes).

**Figure 2-5. Typical Vegetation on Proposed Pilot Plant Site**

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# 3.0 EXISTING CONDITIONS AND ENVIRONMENTAL CONSEQUENCES

## 3.1 Land Use

### 3.1.1 Existing Conditions

During the public scoping process, comments were received from several individuals concerned about the re-zoning of the site for the proposed Pilot Plant. The proposed site is within the City of Kanab, approximately 2.5 miles south of the downtown area. The land is administered by Utah SITLA and is part of a 10-acre parcel to be leased to Viresco. The terms and conditions of this lease have been negotiated but it has not been signed. The project site consists of undeveloped land containing shrub and grassland vegetation. Land uses on adjacent properties all consist of undeveloped land similar in nature to the project site.

Land developments in the general area of the project site include the Kane County Public Safety Facility (Figure 3-1) that is currently under construction approximately 0.5 mile to the southeast, Kane County Landfill (Figure 3-2) approximately 1.0 mile to the southeast, the Kanab Municipal Airport (Figure 3-3) approximately 0.5 mile to the northwest, the Kaneplex Rodeo Grounds (Figure 3-4) and facilities (including a shooting range) between the Kane County Public Safety Facility and the Kane County Landfill, and two cellular telephone towers. One of the towers is to the east of the site between the safety facility and the landfill (approximately 300 feet in height) and the other tower is to the east of the landfill (approximately 140 feet in height). There are also three cellular telephone towers along US 89A adjacent to or on the airport, which range in height from 24 to 50 feet in height (Antenna Search, 2009).

**Figure 3-1. Kane County Public Safety Facility Construction, looking Northwest from Kaneplex Road**

**Figure 3-2. Kane County Landfill (east end of Kaneplex Road)**

**Figure 3-3. Kanab Municipal Airport**

**Figure 3-4. Kaneplex Rodeo Grounds**

Viresco submitted an application to the City of Kanab to re-zone the 10-acre property from RR-1 (Very Low Density Residential) to M2 (Light Manufacturing) on October 13, 2010, which was approved by a unanimous vote at the Kanab City Council Meeting on November 9, 2010 (City of Kanab, 2010). The M2 zoning designation is meant "to provide space for small warehousing, light manufacturing, fabrication, wholesaling, service and other similar commercial establishments which are combined with manufacturing or warehousing uses and to locate these establishments in a location compatible with one another and where they are convenient to the commercial areas in the City of Kanab". The Kanab Land Use Ordinance does not include permitted uses that would specifically address the project; however, the most applicable use would be "miscellaneous light manufacturing", which is permitted in the M2 designation. Structures within 100 feet of adjoining zones are not allowed to have heights greater than those allowed in the adjoining zone. Properties adjacent to the site are zoned RR-1, which allows buildings up to a height of 40 feet. A conditional use permit was approved by City of Kanab Planning Commission on July 20, 2011 enabling Viresco to exceed height limits otherwise applicable to the Pilot Plant.

Properties adjacent to the 10-acre parcel to be leased by Viresco are zoned RR-1. Kanab's future land use map, dated 2007, has the entire area south of the northern boundary of the airport on the east side of US 89A planned for the RR-1 zoning designation or Planned Parks; however, this area also includes the properties containing the safety facility (under construction), the landfill, and the rodeo facilities. Construction has commenced on a new surface water reservoir (the Jackson Flat Water Supply Storage Project) on Jackson Ranch approximately 0.25 mile north of the site (Figure 3-5). Kanab is planning to develop recreational facilities around the reservoir including three parks, the closest of which would be approximately 0.6 mile to the northeast of the site. In addition, an Outfitter's Post, race track, archery and shooting range, and rodeo are also part of the plans; however, these plans are conceptual and a more definitive plan for the recreational areas is expected at a later date. For example, the area designated for the rodeo is already being used for the Kane County Public Safety Facility (City of Kanab, 2009a).

**Figure 3-5. Telephoto View of Jackson Flat Water Supply Storage Project Construction from Proposed Pilot Plant Site**

### 3.1.2 Environmental Consequences of the Proposed Project

The proposed project would result in the conversion of approximately 1.5 acres of undeveloped vegetated land to facilities to support the Pilot Plant (see Figure 2-3, previous). Although surrounding lands are zoned RR-1, the properties in the immediate vicinity of the site are undeveloped, and an existing landfill and safety facility (under construction) are in close proximity. Thus, construction and operation of the Pilot Plant would be considered compatible with existing land uses in the area; however, Kanab's future plans for the area within 0.25 miles to the north of the site include recreational land uses. Use of the site for an industrial facility (the Pilot Plant) would not be considered compatible with recreational sites, such as parks, primarily due to diminished aesthetic quality (see Section 3.2, Aesthetics).

Aside from adverse aesthetic impacts, construction and operation of the Pilot Plant would not be expected to cause any physical alterations to adjacent properties. Offensive odors are not anticipated but any odors would be expected to dissipate effectively before reaching any residential areas given the isolated location of the Pilot Plant. Viresco would make every practicable effort to avoid creating noise, exhaust emissions, and odors at the site. Viresco would comply with Chapter 10 of Kanab's Land Use Ordinance, which sets restrictions on nuisances (e.g., glare and odors) and physical hazards on industrial properties (City of Kanab, 2009). In addition, the Pilot Plant stack could be up to 67 feet in height, which required a conditional use permit issued by the City of Kanab Planning Commission (July 20, 2011) to exceed the 40-foot height limit.

Although adjacent properties are zoned RR-1, they are currently unoccupied, and the presence of the safety facility and landfill nearby likely makes this location undesirable for residential use regardless of the potential presence of the Pilot Plant. In addition, the plans for recreational facilities in the area are conceptual and Kanab can account for the presence of the Pilot Plant when making final plans (e.g., they could locate parks to the north or east of the reservoir, creating an increased distance to the Pilot Plant). For example, construction is nearing completion for the Kane County Public Safety Facility on land that had been planned for recreational use. It is important to note that Kanab City Planning and Zoning Department approved the zoning change for the site to M2; thus, that department is aware of the project and can plan future land uses in the area accordingly.

Overall, minor adverse impacts to adjacent land uses would be expected for the 30 days of operation during the period of the cooperative agreement with DOE due to the short and intermittent operational duration. The Pilot Plant would be a permanent, non-natural object in the viewshed; however, operational effects would be of a very short and intermittent duration.

Should future operations include operating the Pilot Plant for up to 130 days annually for an undetermined period into the future, impacts would be moderate, as any possible operational effects would occur more often and for a longer period of time.

### 3.1.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operations would not occur; therefore, there would be no changes to land uses as compared to the existing condition.

## 3.2 Aesthetics

### 3.2.1 Existing Conditions

During public scoping, many individuals expressed concerns about the visibility and potential aesthetic impacts of the Pilot Plant. The proposed 1.5-acre project site is within the City of Kanab, approximately 2.5 miles south of the downtown area. The closest residential area to the site is approximately 1.1 miles to the northwest on the opposite side of the Kanab Municipal Airport. Grand Staircase-Escalante National Monument's far southwestern boundary terminates approximately nine miles to the east of the site and Pink Coral Sand Dune State Park is approximately 10 miles to the west with a mountain range in between.

Construction has commenced on a new surface water reservoir (the Jackson Flat Water Supply Storage Project) on Jackson Ranch approximately 0.25 mile north of the site. Kanab is planning to develop recreational facilities around the reservoir including three parks, the closest of which would be approximately 0.6 mile to the northeast of the site; however, this plan is conceptual and a more definitive plan for the recreational areas would be prepared (City of Kanab, 2009a). Other land developments in the general area of the project site are described in Section 3.1, above.

Aesthetic impacts can occur at night due to outdoor lighting. Impacts caused by outdoor lighting are generally attributable to glare, light pollution, and light trespass and encroachment. Glare ranges in severity from unwanted brightness that creates a nuisance to levels causing physical discomfort or disability. Light pollution is generally associated with ground-reflected light, which is scattered by particles and results in the sky glow found in all urban areas. Light trespass or encroachment, like nuisance glare, results from unwanted light affecting an adjacent property or nearby receptors. To preserve night skies, the City of Kanab Land Use Ordinance prohibits direct or sky-reflected glare, whether from flood lights or high temperature processes, excluding outdoor signs or lighting of buildings and grounds for protective purposes. Parking lot lighting also must be "downlighted" so that light does not trespass on adjoining properties (City of Kanab, 2009). In addition, the conditional use permit acquired from the City of Kanab Planning Commission requires a flare enclosure at the end of the exhaust stack further preserving night skies.

### 3.2.2 Environmental Consequences of the Proposed Project

During the 4-month construction period, aesthetic impacts would occur to the residential area 1.1 miles to the northwest of the site (at the closest point). Although the distance is greater than a mile, residents in the area would have views of the site. Adverse aesthetic factors often consist of construction-related noise, truck traffic, dust, and the facility itself as it is constructed. However, based on the distance from the site to the nearest residential receptors, noise, traffic, and dust impacts would not be anticipated as described respectively in Sections 2.9.2, 2.9.3, and 3.5. The viewshed currently contains structures in the foreground associated with Kanab Municipal Airport as well as moving vehicles and airplanes. In addition, the Kane County Public Safety Facility and Kane County Landfill facilities are viewable in the background. Thus, the existing viewshed from the residential area currently contains several manmade elements, such that the construction of the Pilot Plant

would not be as apparent (Figure 3-6). Overall, minor aesthetic impacts would be expected during construction considering the distance to the site.

During operation of the facility, impacts would likely be less intrusive on the residential area to the northwest as fewer activities would be performed at the site. Overall, aesthetic impacts would consist of the visible presence of the facility (see Figure 2-3, previous), a potential minor vapor plume emission from the stack during various weather conditions, and truck traffic at the site. The proposed office/control room/laboratory facility would likely be marginally noticeable, as it would be a relatively small building (19 feet high). The support structure containing the hydrogasifier, fluidized bed regenerator, stack, etc., would be the most noticeable structure, as the stack would likely be approximately 67 feet in height (possibly up to 72 feet with the flare enclosure), while the major part of the structure would be about 60 feet high. The structure would generally look like scaffolding with piping. The structure would have a somewhat small footprint (approximately 680 square feet) thus, it would be viewable from the residential viewpoints and would look a bit different from other developments in the area, but would not represent a major change in aesthetic character considering distance and other manmade features in the area. Gases would be flared from the stack; however, the flame would be shielded from view. As per the conditional use permit approved by the City of Kanab Planning Commission the 67 foot stack would be painted an earth tone color to be approved by the Kanab City building inspector to aesthetically blend in to the viewshed.

Kanab's future plans for the area within 0.5 miles of the north of the site include recreational land uses associated with the new surface water reservoir project (Jackson Flat Water Supply Storage Project). Development of the site for the Pilot Plant would represent an obstruction to natural views to the south from these recreational areas. As described in Section 3.1, the plans for recreational facilities in the area are conceptual and Kanab can account for the presence of the Pilot Plant when making final plans and designs.

A potential minor vapor plume emission may be visible from the surrounding area when operating under certain weather conditions. However, as the Pilot Plant would operate intermittently and over a relatively short duration (30 days of operation under the cooperative agreement with DOE), the occurrence of a visible vapor plume would be occasional and limited in duration. Offensive odors are not anticipated, but any odors would be expected to dissipate effectively before reaching any residential areas given the isolated location of the Pilot Plant in proximity to a sanitary landfill. Viresco would make every practicable effort to avoid creating noise, exhaust emissions, and odors at the site. In addition, Viresco would comply with Chapter 10 of Kanab's Land Use Ordinance, which sets restrictions on nuisances (e.g., odors) and physical hazards on industrial properties (City of Kanab, 2009).

Overall, minor adverse aesthetic impacts to the planned recreational facilities would be expected for the 30-day operational period of the proposed project due to the short and intermittent operational duration. The Pilot Plant would be a non-natural object in the viewshed; however, operational effects would be of a very short and intermittent duration. Should Kanab choose to locate recreational facilities further from the Pilot Plant than current plans indicate, impacts would be less; however, it is currently unknown what the final locations would be.

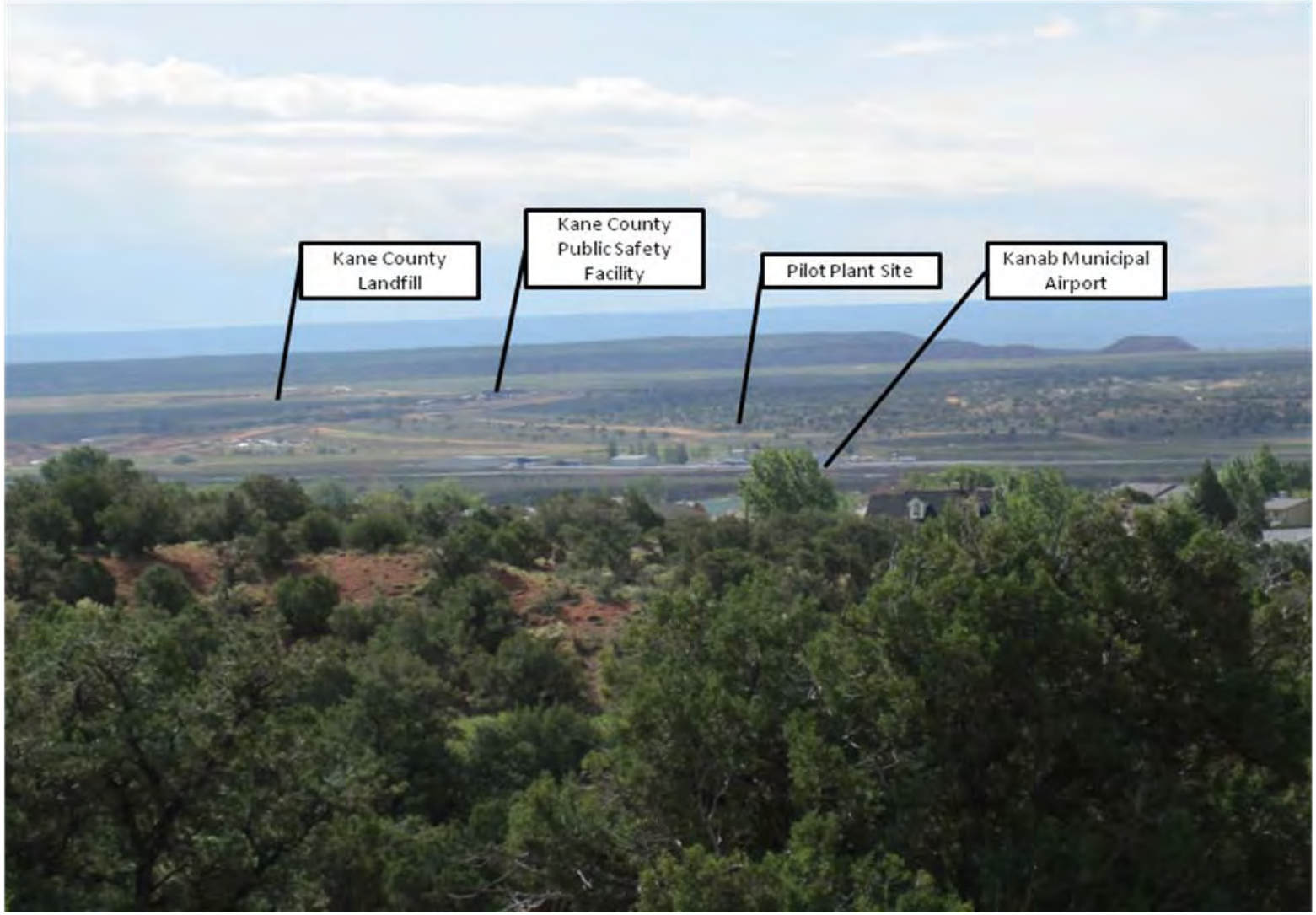



**Figure 3-6. View of Pilot Plant Site, Kanab Municipal Airport, Kane County Public Safety Facility, and Kane County Landfill from Kanab Creek Ranchos Neighborhood Looking Southeast**

Nighttime lighting at the Pilot Plant may be noticeable at the residential properties to the northwest, though several other facilities in the area, most notably the airport, also have light sources, as will the new safety facility; therefore, the overall effect on views would be minor. Light sources would likely be more noticeable from the planned recreational facilities around the future reservoir, but the final layout of these facilities is not currently known. The effect of nighttime sky glow from the proposed Pilot Plant would be minimal, as all external lighting would be downlighted and shielded to ensure that generated light does not trespass on adjacent lands and Viresco would comply with the Kanab Land Use Ordinance. Only reflected light from the ground or indirectly from vertical wall surfaces would be able to affect the surrounding environment rather than direct rays from the light sources. Reflectance values off the ground and vertical surfaces on buildings would be low as the paved areas would be a dark colored asphalt and the walls of the building would be painted so that reflectance values would be low (see Figure 2-3, previous). Lighting on the tallest structures would be as required by the Federal Aviation Administration due to the proximity of the Kanab Municipal Airport. Overall, lighting at the Pilot Plant would cause minor impacts on nearby receptors and dark night skies.

No impacts on National or state parks, monuments, etc. would be expected. The Pilot Plant would not be visible from such distant locations as Grand Staircase-Escalante National Monument and Pink Coral Sand Dune State Park.

Should future operations include operating the Pilot Plant for up to 130 days annually, impacts would be moderate, as any possible operational effects discussed above would occur more often and for a longer period of time.

### 3.2.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operations would not occur; therefore, there would be no changes to the local aesthetic character as compared to the existing condition.

## 3.3 Geology and Soils

### 3.3.1 Existing Conditions

#### 3.3.1.1 Geology

The proposed project site is located within the Colorado Plateau Physiographic Province. The Colorado Plateau is a physiographic province of the U.S. roughly centered on the "Four Corners" area within western Colorado, northwestern New Mexico, southeastern Utah, and northern Arizona. About 50 percent of the surface of the Colorado Plateau Region is administered by the BLM, USFS, NPS, or other Federal agencies. About 23 percent of the area consists of Tribal lands; although those lands are held in trust by the U.S. Government, they are not considered Federal lands and their coal resources are not included in this study. About 26 percent of the region is administered by state agencies or is privately owned (USGS, 2008a).

The terrain is characterized by broad plateaus, ancient volcanic mountains and deeply dissected canyons including the Grand Canyon. The area is semiarid, sparsely vegetated, and sculpted by the Colorado River and its tributaries, the Green, Little Colorado, and San Juan rivers. The region contains substantial amounts of oil, gas, coal, oil shale, and uranium resources and includes the San Juan, Uinta-Piceance, and Paradox Basins and Wasatch, Black Mesa, and Kaiparowits plateau areas.

The Colorado Plateau province is a broad area of regional uplift in southeastern and south-central Utah characterized by essentially flat-lying Mesozoic and Paleozoic sedimentary rocks. Scattered Tertiary and Quaternary volcanic rocks are present on the western margin of the Colorado Plateau in south-central Utah, and some Tertiary intrusive bodies are present in southeastern Utah (UGS, 2011). A generalized stratigraphic section for the Colorado Plateau is shown in Figure 3-7.

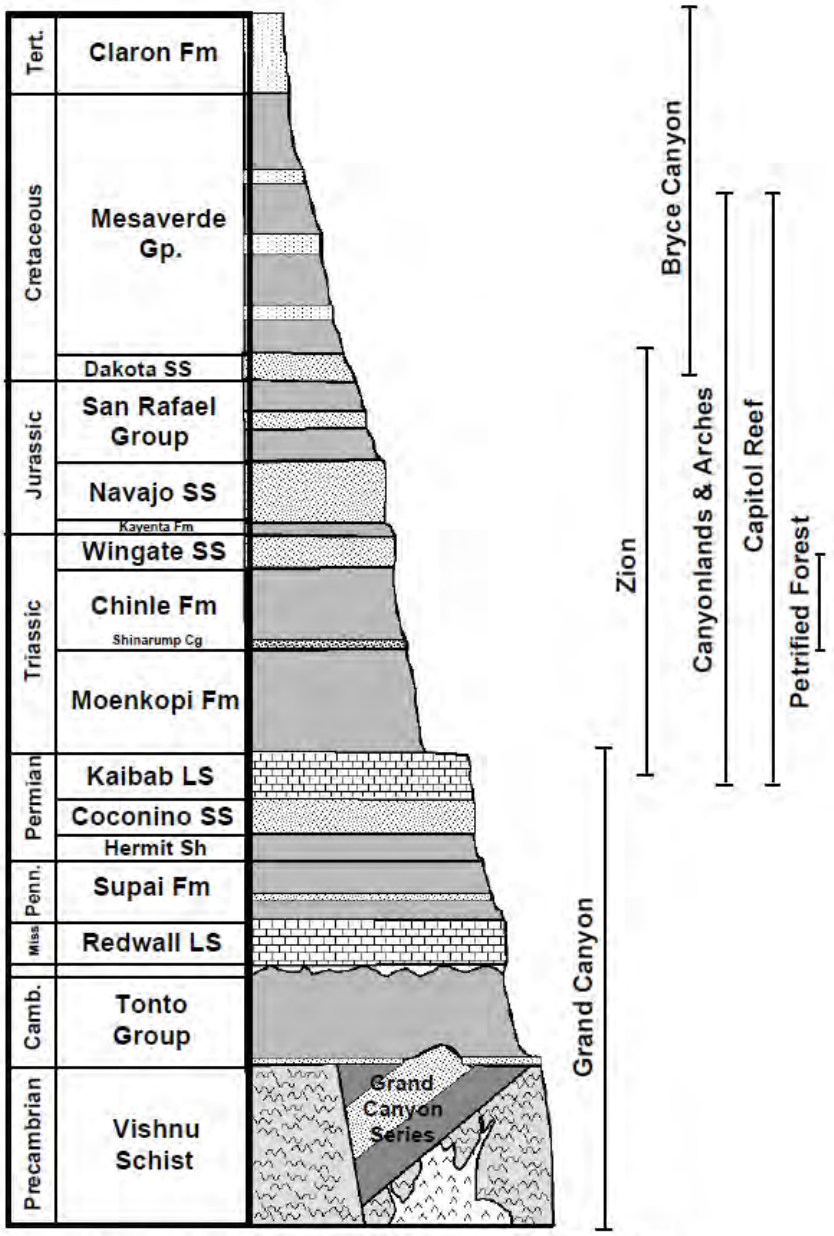



**Figure 3-7. Generalized Stratigraphic Section of the Colorado Plateau**

The Pilot Plant site would be located on gravel, sand, silt and clay deposits that were eroded from the surrounding cliffs and deposited by running water. The geologically young, alluvial deposits are weakly cemented and are typically 16-66 feet thick. The bedrock beneath the unconsolidated material is the Upper Triassic Chinle Formation, which contains multicolored mudstones interbedded with sandstones (USGS, 2004).

### 3.3.1.2 Seismic Conditions

Concerns were raised during the public scoping process about the potential for seismic effects on the safety of the proposed Pilot Plant. Utah experiences many small, low-magnitude earthquakes each year that are recorded by seismologists, but go unfelt by most people. However, there have been larger, damaging earthquakes in the past, such as the Hansel Valley earthquake in 1934 and the Richfield earthquake in 1901 (UDNR/UGS, 1997).

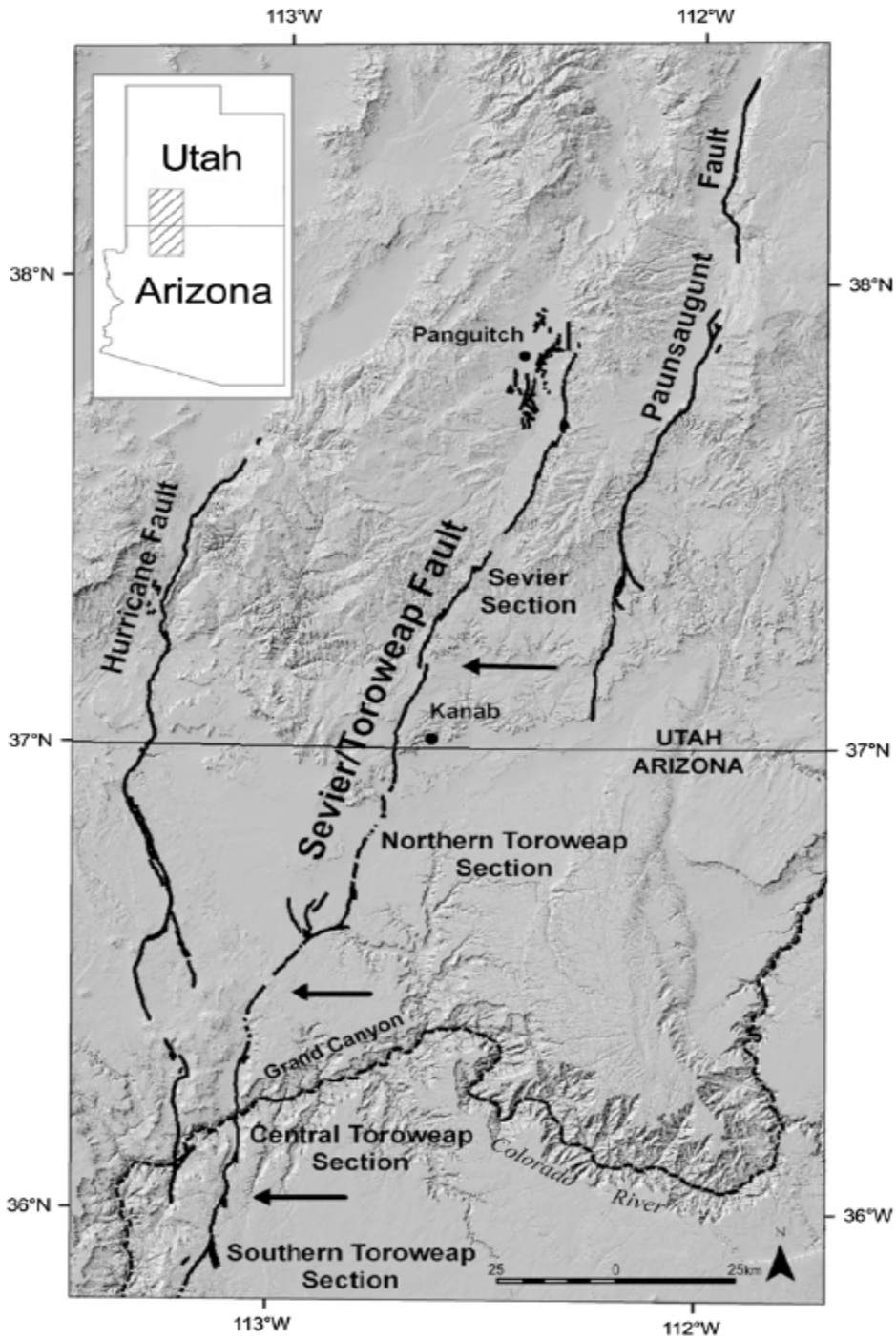
As displayed in Figure 3-8, the nearest seismic source to the proposed project site is the northern section of the Sevier (Toroweap) Fault, located approximately 11 miles west of the site (UDNR/UGS, 2008). The Sevier/Toroweap fault is one of three major sub-parallel, generally north trending faults (along with the Hurricane fault to the west and Paunsaugunt fault to the east) in northwestern Arizona and southwestern Utah that define the transition between the Basin and Range Province to the west and the Colorado Plateau to the east(UDNR/UGS, 2008). Through the National Earthquake Hazard Reduction Program, the USGS generated a geologic seismic hazard probability database to estimate the potential for earthquakes in the U.S. The database uses known fault sequences and historical earthquake data. Models generated from the database show the probability of a damage-inducing earthquake at a specific location. Through this database the U.S. Geological Survey has produced seismic hazard maps that are used to update seismic design maps and provisions contained in building codes, to provide a the basis of design requirements for highway bridges, to set property insurance rates, to estimate landslide potentials of hillsides, and to set waste-disposal facility standards that ensure safety. FEMA also uses the maps to plan allocation of funds for earthquake education and preparedness (USGS, 2001).

According to this database, in the next 30 years there is a 15 to 20 percent chance that a magnitude 5.0 or greater earthquake would occur within 50 kilometers of the project site (Figure 3-9)(USGS, 2011). However, the physical damage from a local earthquake is dependent on the magnitude of the seismic event, a location's distance to the epicenter, the stability of the ground and the structural integrity of the building. A calculation called the Peak Ground Acceleration (PGA) predicts the amount of shaking a location could feel from any earthquake in the area, based on a model of the predicted size of earthquakes that have a 10 percent chance of occurring in the next 30 years. The PGA value for Kanab is about 7 percent, which means there is a 10 percent chance that in the next 30 years, Kanab could be shaken of a force of 7 percent times the coefficient of gravity (USGS, 2008b). This amount of shaking would classify as "moderate" with "very light" potential damage, primarily to poorly built structures.

#### 3.3.1.3 Soils

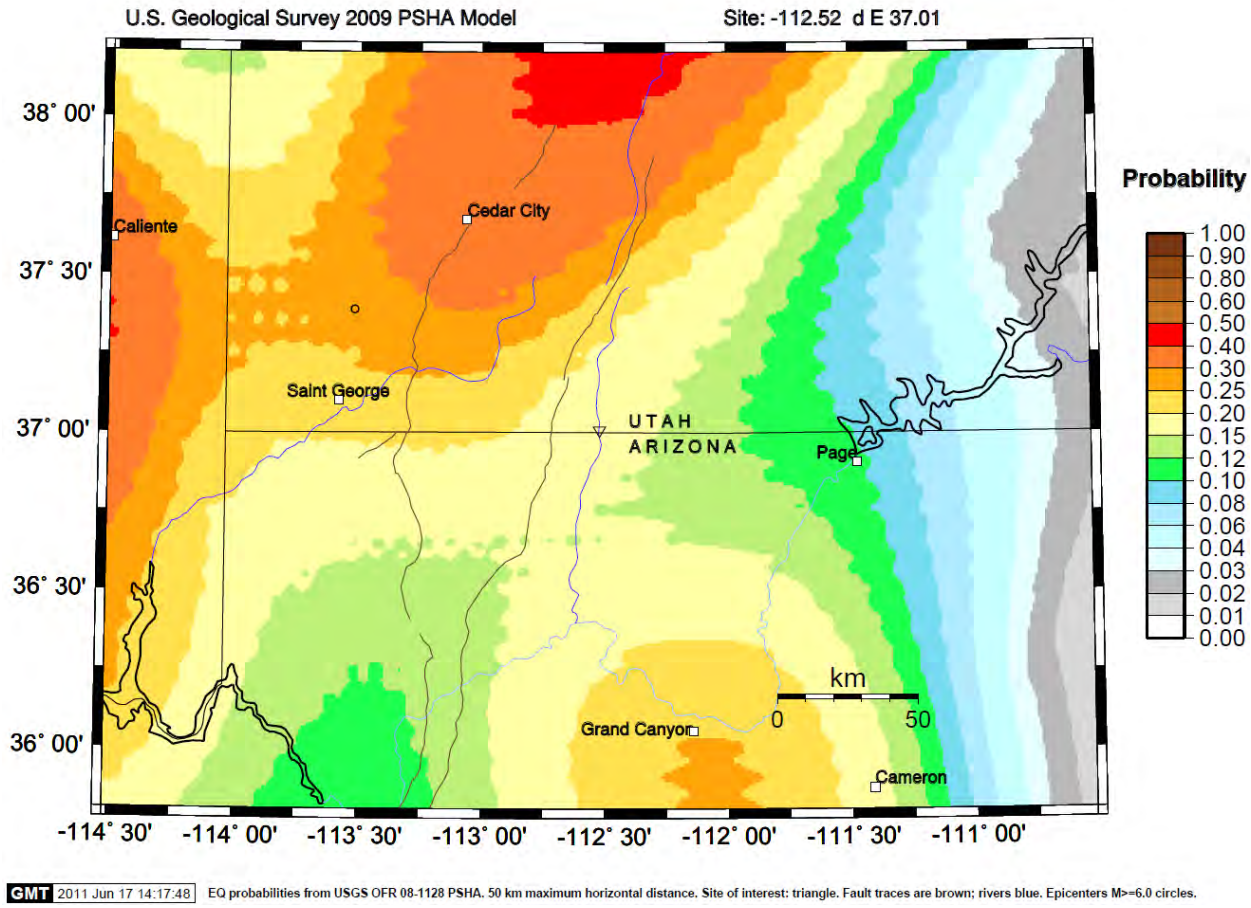
The Federal Farmland Protection Policy Act (Public Law 97 98; 7 U.S.C. 4201 et seq.) has been enacted in an effort to document the potential impacts to agricultural land through the NEPA process and to preserve land with the potential to consistently produce food and raw materials. The supply of high quality farmlands is limited; therefore, the USDA encourages the preservation of soils classified as prime farmland, or soils used for agriculture unique to the state. Prime farmland soils are defined by the USDA as: "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods." (USDA, 2010). There are only 16 acres in Kane County designated as Prime and Unique Farmland with the classification of "Prime Farmland if Irrigated" (USDA/NRCS 2005). The proposed project site does not contain any Prime and Unique Farmland.

The soils on the proposed project site have not been mapped by the Natural Resources Conservation District (NRCS). However, a geotechnical soils analyses was completed by TC Engineering, PC on December 2, 2010 for the proposed project site. The investigation consisted of a review of the surface as well as subsurface conditions encountered in three test trenches dug to a depth of 6.5 feet (see Table 3.3-1) throughout the 1.5 acre parcel to be disturbed for the Pilot Plant. The soils at the proposed project site consist of Silty Sands (SM), and Sandy Clays (CL) with and without base material (TC, Engineering, PC, 2010).




Source: UDNR/UGS, 2008

**Figure 3-8. View of existing faults in southern Utah and northern Arizona**




Source: USGS, 2011

**Figure 3-9. Probability of an Earthquake within 30 years and 50 kilometers**

**Table 3.3-1. Soils Encountered in Test Trenches**

| Test Trench Location | Northwest | Center | Southeast |
|---|---|---|---|
| ***Depth (feet)*** | ***Soils Type*** | ***Soils Type*** | ***Soils Type*** |
| 0 - 0.5 | Topsoil | Topsoil | Topsoil |
| 0.5 - 3 | Moist Red Silty Sand (SM) | Moist Red Silty Sand (SM) | Moist Red Silty Sand (SM) |
| 3 - 4 | Moist Red Silty Sand (SM) | Moist Red Silty Sand (SM) | Stiff sandy clay (CL) with gypsum |
| 4 -6.5 | Refusal | Refusal | Stiff sandy clay (CL) with gypsum |
| 6.5 | | | Refusal |

Source: TC, Engineering, PC, 2010

### 3.3.2 Environmental Consequences of the Proposed Project

#### 3.3.2.1 Geology

There would be no impacts to geologic resources from construction of the project as it is not expected that any drilling or extensive excavating would be required at this site. Construction would not induce seismicity, nor would it impact high-value or unique geologic resources so that they are inaccessible, or cause measurable displacement of the ground surface. The area is in an increased risk for seismic activity; however, the plant would be built with the appropriate measures for industrial structures in an area subject to the level of seismic risk.

#### 3.3.2.2 Soils

Under the proposed project, a direct permanent adverse impact would occur to the approximate 1.5 acres of soils associated with the project site. These soils would be graded for construction of the proposed project, which would require paving and establishment of impervious surface to support the plant and associated infrastructure (i.e., entrance roads, parking, and stormwater management). These impacts, however, would be localized and minor. Soil disturbance as a result of grading, excavation for the foundation and other construction activities increases the potential that the topsoil would experience increased erosion. Prior to construction, a NPDES permit would be required from the state authority regulating water quality in runoff from construction sites. The permit requires operators to implement stormwater controls and develop a SWPPP, which includes BMPs to prevent sediments and other pollutants associated with construction sites from being discharged in stormwater runoff. Potential BMPs include sequestering topsoil as needed, erecting silt fences, and temporarily seeding bare soils areas with native vegetation. Viresco would ensure that the construction contractor implements erosion BMPs to reduce the overall impacts on soils to minor and temporary during construction.

After construction, disturbed areas, such as equipment laydown areas that are not part of the active facility, would be seeded with appropriate vegetation as part of the SWPPP to prevent erosion and sedimentation of exposed soils.

There would be no impact to prime farmlands as soils at the site are characterized as silty sands and sandy clay, which are not designated as prime farmland soils. The gentle topography and composition of the soils, combined with the erosion BMPs to be described in the SWPPP, would reduce the potential impacts to soils to minor during construction.

### 3.3.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, ground disturbance associated with construction of the proposed Pilot Plant would not occur and geologic resources would remain in place; thus, no impacts would occur from the proposed project.

## 3.4 Cultural Resources

### 3.4.1 Existing Conditions

Bighorn Archaeological Consultants, L.L.C., completed a cultural resource inventory of the Kanab Steam Hydrogasification Pilot Plant project in Kane County, Utah. The inventory was undertaken at the request of Viresco to assist the Utah SITLA in fulfilling requirements under various Federal and state environmental protection laws, including the NHPA, NEPA, and Utah Antiquities Act (UCA 9-8-404).

Prior to initiating fieldwork, Bighorn conducted a records search through the Utah Division of State History on September 15, 2010 for reported projects and previously recorded cultural resources. The search revealed 26 previously recorded cultural resources and 19 previous inventories within one mile of the project area (Nash et al. 2010: Tables 2, 3). Cadastral plats/General Land Office maps and other historic maps of the area were also reviewed for the presence of historic features, such as roads, ditches, cabins, and trails. Results of the literature review and file search indicated that one previously recorded cultural site, 42KA5613, was located within the proposed project area.

A Class III cultural resource inventory of the area of potential effect for the proposed project was completed on September 29, 2010 (Nash et al. 2010). During the inventory, personnel examined the project area using pedestrian transects spaced no more than 15 m (50 feet) apart. The purpose of the inventory was to identify all cultural resources within the project area, evaluate their eligibility for inclusion in the NRHP, and assess the potential impacts of the undertaking on eligible properties.

Examination of the project area resulted in the discovery and documentation of one new cultural site, 42KA6967, and the previously recorded cultural site, 42KA5613, was also relocated. Site 42KA6967 is a large aboriginal open lithic scatter of unknown date and cultural affiliation as no diagnostic artifacts were found. It is located within a 272 m by 141 m (22,695 $m^2$) area on a low ridge north of the Shinarump Cliffs and south of Jackson Flat. Soil on the site consists of very fine well sorted tan sand. Vegetation in the area includes scattered big sagebrush, sand sagebrush, juniper, and sparse rabbit brush. The site has been impacted by erosion, grazing, and recreational use of the area.

Site 42KA5613 was originally recorded by Rainbow Country Archaeology in 2000 as an historic trash scatter dating from the mid to late twentieth century. The site was revisited by Bighorn in 2010 and a site form update was completed. The site is located within a 58 by 32 m (1,228 $m^2$) area to the south of the Kaneplex road on the northern side of a gradually sloping low knoll and above an ephemeral drainage to the north of the Shinarump Cliffs and south of Jackson Flat. Soil on the site consists of fine tan sand with sparse gravels. Vegetation in the area includes scattered juniper, low sagebrush, sand sagebrush, prickly pear and cholla cacti, yucca, and various bunch grasses and forbs. The site has been impacted by erosion, grazing, and recreational use of the area.

Bighorn considered both sites to be not eligible to the NRHP. In late 2010 their report was submitted by SITLA to the Utah Department of Community and Culture State Historic Preservation Office (SHPO) as per the SHPO-SITLA cultural resources consultation Programmatic Agreement (SHPO Case No. 11-0075). The Deputy State Historic Preservation Officer, concurred with the determination of no historic properties affected, in an email to DOE dated June 8, 2011.

Because of the location of the proposed Pilot Plant site within approximately 0.25 mile of the Jackson Flat Water Supply Storage Project, and because Native American remains were inadvertently discovered during the construction for that project, the Kaibab Band of Paiute Indians have expressed serious concerns about the siting of the proposed Pilot Plant. The Kaibab Band anticipates that the project may inadvertently uncover Native American remains during construction, and they expressed their concerns in a letter to DOE dated June 13, 2011 (Appendix A). That letter also outlines the Kaibab Band's particular interests for the resources and issues to be evaluated by DOE for this project, which have been addressed to the extent practicable in this EA.

### 3.4.2 Environmental Consequences of the Proposed Project

Examination of the proposed project area resulted in the discovery and documentation of two cultural resources, both of which have been determined by the SHPO to be not eligible for inclusion on the NRHP. Because of the SHPO concurrence with the determination of no historic properties affected, no further action is required at these sites. In a letter dated June 6, 2011 the Director of the Hopi Cultural Preservation Office, on behalf of the Hopi Tribe, agreed that the proposed project is unlikely to affect cultural resources significant to the Hopi Tribe. In a letter dated July 5, 2011 the Supervisory Anthropologist, on behalf of the Navajo Nation historic Preservation Department-Traditional Culture Program, concluded that the proposed project will not impact Navajo traditional cultural resources (see Appendix A for these correspondences). DOE initiated formal government-to-government consultation with the Kaibab Band with participation in the Tribal Council meeting on July 21, 2011. DOE also followed up with a letter to the Kaibab Band dated August 1, 2011 (see Appendix A).It is unlikely but possible that unanticipated discoveries may be made during construction. For example, the construction for the Kane County Public Safety Facility, which is also approximately 0.5 mile from the proposed Pilot Plant site and situated along the same topographic feature, has not uncovered any human remains or artifacts. Unanticipated discoveries include archaeological materials, both prehistoric and historic, and human remains. In the event that an unanticipated discovery is made, all construction activity in the immediate vicinity of the discovery would cease and a buffer zone of 100 feet would be established; this is large enough to protect the discovery itself as

well as any associated artifacts or features, and to provide an adequate area for a safe investigation of the discovery. Human remains discovered on state lands will be treated under the provisions of applicable state laws (State of Utah Code Annotated 9-9-401 et seq., 7-9-704, 9-9-305, 9-8-176). The DOE will be notified immediately, along with the relevant county coroner or sheriff, SITLA, SHPO and Tribes, in a timely manner. The age, affiliation, and circumstances of the burial (or other discovery) will be assessed. Human remains discovered on state lands in Utah can be excavated only pursuant to a separate permit and after consultation with the Native American Remains Committee and the affiliated tribe.

The DOE will develop an emergency discovery plan, as well as a plan for the treatment of human remains, should such be found during construction. Both plans will be in place prior to construction start-up. Since the proposed project would not affect any properties potentially eligible for listing on the NRHP, SHPO will not require an on-site archaeological monitor. Therefore, DOE will ensure that an on-site or construction supervisor would monitor the excavation process. Upon any discovery, DOE will be contacted immediately and a buffer zone will be created around the discovery site. DOE will then contact the interested Tribes (Kaibab, Hopi and Navajo), the County coroner, the County sheriff's office, the Utah SHPO, and SITLA, the landowner. DOE would insure that a contract with a qualified archeological consultant will be in place in advance that could be tasked to respond in the event of a discovery. The consultant would be local and available to be onsite in a matter of 24 to 72 hours to ensure that appropriate actions are taken to protect the resource, and undertake appropriate notifications and coordination. All discovered human remains would be treated with respect and dignity. The consultant would provide DOE with a report noting the type and significance of the discovery. DOE would then consult with the Tribes on how the remains are handled.

### 3.4.3 Environmental Consequences of the No Action Alternative

Under this alternative, the site would not be developed as the Utah Coal and Biomass Fueled Pilot Plant. There would be no impacts to existing historic or cultural resources under this alternative.

## 3.5 Air Quality and Climate

### 3.5.1 Existing Conditions

#### 3.5.1.1 National Ambient Air Quality Standards and Existing Air Quality

The United States Environmental Protection Agency (USEPA) Region 8 and the UDEQ regulate air quality in Utah. The CAA (42 USC 7401-7671q) gives USEPA the responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) that set acceptable concentration levels for seven criteria pollutants: particulate matter less than 10 microns in aerodynamic diameter ($PM_{10}$), particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$), sulfur dioxide ($SO_2$), carbon monoxide (CO), nitrous oxides ($NO_x$), ozone ($O_3$), and lead. Short-term standards (1-, 8-, and 24-hour periods) have been established for pollutants that contribute to acute health effects, while long-term standards (annual averages) have been established for pollutants that contribute to chronic health effects. Each state has the authority to adopt standards stricter than those established under the Federal program; however, Utah accepts the Federal standards (Table 3.5-1).

Federal regulations designate Air Quality Control Regions (AQCRs) that are in violation of the NAAQS as nonattainment areas, and those in accordance with the NAAQS as attainment areas. Kane County (and therefore the proposed biomass facility) is in the Four Corners Interstate AQCR 014 (40 CFR 81.121). USEPA has designated Kane County as in attainment for all criteria pollutants (USEPA, 2011b). Because the project is in an attainment area, the air conformity regulations do not apply. Nevertheless, because of the concerns raised by many during the public scoping process about emissions, DOE gave full consideration to the project emissions and the applicability thresholds under the general conformity rules to determine the level of impact under NEPA.

Worst-case ambient air quality conditions can be estimated from measurements conducted at air-quality monitoring stations (Table 3.5-1). Notably, because of the relatively rural area and generally good air quality

conditions, levels of CO, $NO_2$, $SO_2$, and $PM_{10}$ are not monitored in Kane, or neighboring Washington and San Juan counties.

**Table 3.5-1. Air Quality Standards and Ambient Air Concentrations near Kane County**

| Pollutant | 2006 | | 2007 | | 2008 | | Federal Standards | |
|---|---|---|---|---|---|---|---|---|
| | Washington | San Juan | Washington | San Juan | Washington | San Juan | Primary[1] | Secondary[2] |
| **Ozone (parts per million - ppm)** | | | | | | | | |
| 8-hour highest[3] | 0.076 | 0.073 | 0.077 | 0.074 | 0.076 | 0.075 | 0.075 | Same as Primary Standard |
| 8-hour 2nd highest | 0.075 | 0.071 | 0.077 | 0.074 | 0.074 | 0.073 | - | - |

Source: USEPA, 2011a

[1] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
[2] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects f pollutant.
[3] Not to be exceeded by the 3-year average of the annual 4th highest daily maximum 8-hour average.

Class 1 Federal lands include areas such as national parks, national wilderness areas, and national monuments. These areas are granted special air quality protections under Section 162(a) of the Federal CAA. Federal regulations require the operator of any new major stationary source located within 100 kilometers of a Class I area to contact the Federal Land Managers for that area (40 CFR 51.307). Table 3.5-2 outlines the Class I areas in Utah and Arizona and their approximate distance from the proposed facility.

**Table 3.5-2. Class 1 Areas in Utah**

| Area Name | Acreage | Approximate Miles (kilometers) From Proposed Project | Federal Land Manager |
|---|---|---|---|
| Arches National Park | 65,098 | 200 (322) | National Park Service |
| Bryce Canyon National Park | 35,832 | 45 (72) | National Park Service |
| Canyonlands National Park | 337,570 | 165 (266) | National Park Service |
| Capitol Reef National Park | 221,896 | 110 (177) | National Park Service |
| Zion National Park | 142,462 | 30 (48) | National Park Service |
| Grand Canyon National Park | 1,176,913 | 45 (74) | National Park Service |
| Sycamore Canyon Wilderness | 47,757 | 135 (216) | US Forest Service |

Source: USEPA, 2011c

### 3.5.1.2 Climate

The proposed facility is in Kane County, Utah with little development beyond nearby farms and scattered homes. Surface elevations in the area range from about 4,900 to 5,040 feet above mean sea level, and topography in the area consists of gently rolling hills and valleys with scattered lakes. Kanab, Utah, the largest city in Kane County, has an average high and low temperature in the coldest month, January, of 47.3 °Fahrenheit (°F), (8.5°Celsius (°C)) and 21.9°F (-5.6°C), respectively, and an average high and low temperature in the warmest month, July, of 90.8°F (32.6°C) and 56.8 °F (13.7°C), respectively. Kanab also has an average annual precipitation of 14.9 inches per year. The wettest month of the year is March with an average rainfall of 1.9 inches (Idcide, 2011).

GHG's are components of the atmosphere that trap heat relatively near the surface of the earth and, therefore, contribute to the greenhouse effect and global climate change. Most GHGs occur naturally in the atmosphere, but increases in their concentration result from human activities such as the burning of fossil fuels. Global

temperatures are expected to continue to rise as human activities continue to add carbon dioxide, methane, nitrous oxide, and other greenhouse (or heat-trapping) gases to the atmosphere. Human health, agriculture, natural ecosystems, coastal areas, and heating and cooling requirements are examples of climate-sensitive systems. Some observed changes include shrinking of glaciers, thawing of permafrost, later freezing and earlier break-up of ice on rivers and lakes, lengthening of growing seasons, shifts in plant and animal ranges and earlier flowering of trees (USEPA, 2007; IPCC, 2007).

Federal agencies, states, and local communities address global climate change by preparing GHG inventories and adopting policies that would result in a decrease of GHG emissions. The President's CEQ recently released draft guidance on when and how Federal agencies should consider GHG emissions and climate change in NEPA. The draft guidance includes a presumptive effects threshold of 25,000 metric tons of carbon dioxide equivalent emissions from an action (CEQ, 2010).

### 3.5.2 Environmental Consequences of the Proposed Project

Short- and long-term minor adverse effects on air quality would be expected from the proposed project. The effects would be from air emissions during construction, and from the operation of the proposed coal/biomass fueled Pilot Plant. Increases in emissions would be *de minimis* (of minimal importance) and would not contribute to a violation of any Federal, state, or local air regulation. New stationary sources of air emissions associated with the project would not exceed the major source threshold and would not be large enough and/or close enough potentially to affect a Class I area.

Notably, no coal or biomass would be directly combusted at the proposed facility. All operations would be on a testing scale, and full-scale production or storage of any fuels or materials would not be conducted at the site. The total amount of emissions from the facility would be very small, and the emissions would not be toxic in nature. Offensive odors are not anticipated but any odors would be expected to dissipate effectively before reaching any residential areas given the isolated location of the Pilot Plant therefore no downwind effects and no adverse effects to human health or welfare are anticipated. The facility neither would introduce localized hot spots of air pollutants, nor jeopardize the attainment status of the region.

To determine the feasibility of the hydrogasification process, small amounts of syngas would be produced. Syngas is comprised of "clean" fuels such as hydrogen and methane ($CH_4$), and other common inert materials such as nitrogen, oxygen, carbon dioxide, and water. Engineering controls in the form of a flare exhaust would be installed to eliminate any syngas emissions from the hydrogasification process. Table 3.5-3 contains a breakdown of the different components of syngas and the emissions from the flare exhaust after it is combusted. Notably, emissions would be made up almost entirely of typical combustion gas components (nitrogen, oxygen, carbon dioxide, and water vapor) with small amounts of, criteria pollutants (i.e. non-hazardous) and a minute amount of uncombusted hydrogen. With regard to hazardous air pollutants (HAPs), high molecular weight organic compounds or toxic metals would not be expected in quantities that would pose a health hazard, based on the combustion efficiency of the flare and the small concentrations of metals in the feedstock to the gasifiers.

**Table 3.5-3. Components of Syngas and Breakdown of Emissions from the Flare Exhaust**

| Constituent | Mole Fraction [%] | |
|---|---|---|
| | Syngas | Flare Exhaust |
| Nitrogen ($N_2$) | 1.13% | 59.26% |
| Oxygen ($O_2$) | - | 2.51% |
| Hydrogen ($H_2$) | 44.62% | 0.01% |
| Water ($H_2O$) | 32.60% | 30.75% |
| Hydrogen sulfide ($H_2S$) | 0.20% | - |
| Carbon monoxide (CO) | 8.05% | 0.01% |
| Carbon dioxide ($CO_2$) | 7.46% | 7.27% |
| Methane ($CH_4$) | 5.83% | - |
| Ammonia ($NH_3$) | 0.12% | - |
| Carbon oxide sulphide (COS) | <0.01% | - |
| Sulfur Dioxide ($SO_2$) | - | 0.02% |
| Nitrogen oxide (NO or $NO_x$) | - | 0.03% |
| **Total** | **100%** | **100%** |

### 3.5.2.1 Estimated Emissions and General Conformity

The general conformity rules require Federal agencies to determine whether their action(s) would increase emissions of criteria pollutants above preset threshold levels (40 CFR 93.153(b)). These *de minimis* (of minimal importance) rates vary depending on the severity of the nonattainment and geographic location. Because the region is in attainment, the air conformity regulations do not apply. However, all direct and indirect emissions of criteria pollutants for the proposed project have been estimated and compared to *de minimis* threshold levels of 100 tpy to determine the proposed project's impact under NEPA. The total direct and indirect emissions associated with constructing the proposed facilities, and operating new stationary sources of air emissions, would be *de minimis* (Table 3.5-4). These effects would be minor. A detailed breakdown of construction and operational emissions is included in Appendix D.

**Table 3.5-4. Proposed Project Emissions Compared to Applicability Thresholds**

| | Emissions (tpy) for 30 days of Operation | | | | | | *De minimis* threshold (tpy) | Would emissions exceed applicability thresholds? [Yes/No] |
|---|---|---|---|---|---|---|---|---|
| Activity | CO | $NO_x$ | VOC | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ | | |
| Construction | 4.0 | 5.5 | 0.8 | <0.1 | 0.3 | 0.3 | 100 | No |
| Operational | 3.5 | 1.2 | <0.1 | 1.2 | <0.1 | <0.1 | | |

For the purposes of calculating emissions, it was assumed that nine permanent personnel would be employed at the proposed facility, and the plant would operate 30 days during the period of the cooperative agreement with DOE.. Moderate changes in the size or type of equipment ultimately selected, the number of personnel, or expanding the operation schedule would not substantially change the total direct or indirect emissions or the level of impact under NEPA.

### 3.5.2.2 Regulatory Review

Stationary sources of air emissions associated with a proposed project may be subject to Federal and state air permitting regulations. These requirements include, but are not limited to, minor new source review (NSR),

prevention of significant deterioration (PSD), and new source performance standards (NSPS) for selected categories of industrial sources. The proposed facility would have emissions so low that they would be exempt from the air permitting requirements R307-401-5 through 8, Permit Notice of Intent thru Approval Order; hence, no Permit to operate it would be required. The facility would fall under the small source exemption (R307-401-9), which allows very small sources of air pollution greater flexibility to make changes in their emissions as long as they remain eligible for the exemption. Under this exemption, the facility would:

1) Emit less than 5 tpy of $PM_{10}$, $SO_2$, CO, $NO_x$, and volatile organic compounds (VOC);

2) Emit less than 500 pounds per year of any HAP, and less than 2,000 pounds per year for any combination of HAPs; and

3) Emit less than 500 pounds per year of any air contaminant not listed in (1) or (2) above and less than 2,000 pounds per year of any combination of air contaminants not listed in (1) or (2) above.

Viresco submitted a Small Source Exemption Registration, which was reviewed and approved by UDEQ, DAQ (UDEQ, 2010). A copy of the Small Source Exemption Registration and the UDEQ approval letter are in Appendix A.

Under the connected action of possible future operation, the Pilot Plant may operate up to 130 days per year. If the Pilot Plant's total emissions under this scenario were to exceed the levels outlined in the small source exemption, the facility would need to obtain a minor source operating permit from UDEQ.

Notably, other non-permitting requirements may be required during construction through the use of compliant practices and/or products. These regulations are outlined in Utah Code Title 19, Chapter 2, and Utah Air Conservation Act. They include:

- Permissible Open Burning (Utah Code 19-2-114)
- Prohibition of Particulate Matter (Utah Code 19-2-102)

In addition to those outlined above, no person shall handle, transport, or store any material in a manner which may allow unnecessary amounts of air contaminants to become airborne. During construction reasonable measures may be required to prevent unnecessary amounts of particulate matter from becoming airborne (Subsection 102-14). This listing is not all-inclusive; Viresco and all contractors would comply with all applicable air pollution control regulations. Outside of these BMPs, no mitigation measures would be required for the construction and operation of the proposed facility.

#### 3.5.2.3 Greenhouse Gases and Global Climate Change

The CEQ recently released draft guidance on when and how Federal agencies should consider GHG emissions and climate change in NEPA. The draft guidance includes a presumptive effects threshold of 25,000 metric tons of carbon dioxide equivalent emissions from an action (CEQ, 2010).

The proposed project would produce a very minor increase in GHG emissions to the atmosphere. The proposed project would generate approximately 543 tpy of $CO_2$. This is equivalent to annual GHG emissions from 96 passenger vehicles, or the electricity use of 60 homes for one year (USEPA, 2011a). The GHG emissions would be well below the CEQ presumptive effects threshold for impacts from this project. Cumulative impacts of GHG emissions and climate change are addressed in Section 4.2.6.

### 3.5.3 Environmental Consequences of the No Action Alternative

Selecting the No Action Alternative would result in no impact to ambient air-quality. No construction would be undertaken, and no new facility operations would take place. Ambient air-quality conditions would remain as described in Sections 3.5.1.

No-Action, meaning that this proposed project is not carried out in any setting, would delay planned steam hydrogasification projects by perhaps several years. The increased understanding of feedstock conversion to clean, high-energy fuel sources would not be gained, nor could an example of successful and safe steam hydrogasification, on any scale, be offered to the public in support of a larger, more expensive project. The complexities of a larger pilot might translate to long delays in public and regulatory approval, thereby jeopardizing the overall project goals of developing clean domestic fuels from coal and biomass.

## 3.6 Groundwater

### 3.6.1 Existing Conditions

During the scoping process, members of the public expressed concerns about the potential for contamination of groundwater sources by the proposed Pilot Plant. The City of Kanab overlies a consolidated rock aquifer system known as the Colorado Plateaus aquifers. The Colorado Plateaus aquifers underlie an area of approximately 110,000 square miles in western Colorado, northwestern New Mexico, northeastern Arizona, and eastern Utah. This area is approximately coincident with the Colorado Plateaus Physiographic Province. The Colorado Plateaus aquifers are contained in a thick sequence of poorly to well-consolidated conglomerate, sandstone, siltstone, and shale. Volcanic rocks, carbonate rocks, and evaporate deposits in the area also can yield water to wells. Structural deformation, faulting, and lateral changes in the lithology of the rocks have produced a complex sequence of water-yielding layers (USGS, 1995 and USGS, 1995a).

The many water-yielding units in the Colorado Plateaus aquifers are narrowed and grouped into four principal aquifers known as the Uinta-Animas aquifer, the Mesaverde aquifer, the Dakota-Glen Canyon aquifer system, and the Coconino-De Chelly aquifer. The City of Kanab is located above the Coconino-De Chelly aquifer (Figure 3-10). The formations that comprise the Coconino-De Chelly aquifer are the Coconino, De Chelly, and Glorieta Sandstones; the San Andres Limestone; and the Yeso and Cutler Formations. In the areas where the altitude of the potentiometric surface of the Coconino-De Chelly aquifer has been mapped, ground water generally flows from the structural uplifts toward the major surface-water drainages. The aquifer is recharged in the Uncompahgre Uplift, Paradox Basin, San Rafael Swell, Circle Cliffs Uplift, Defiance Uplift, Zuni Uplift, and Mogollon Slope. Discharge mainly is to the Colorado and Green Rivers (USGS, 1995a).

Groundwater can be classified according to concentration of total dissolved solids (TDS):

- Freshwater: < 1,000 milligrams per liter (mg/L) TDS.
- Brackish water: 1,000 to 10,000 mg/L TDS.
- Saline water: 10,000 to 100,000 mg/L TDS.
- Brine water: >100,000 mg/L TDS.

The total dissolved solids concentration in water from the Coconino-De Chelly aquifer in Utah, ranges from less than 1,000 mg/L to 10,000 mg/L (USGS, 1995a). Water containing less than 10,000 mg/L TDS is considered a drinking water source and is protected and regulated by the UDEQ, Division of Water Quality. Utah is also governed by the prior appropriation doctrine and the fact that all water is a public resource. The state engineer and the Division of Water Rights are responsible for administering groundwater rights in the state (BLM, 2001).

Source: USGS, 1995a

**Figure 3-10. Distribution of the Coconino-De Chelly Aquifer**

The City of Kanab withdraws approximately 2.5 to 3 million gallons a day from 15 wells in the Lamb Point Tongue of the Navajo and Navajo Aquifers, drilled down 300 to 700 feet below ground surface. The City of Kanab does not have a water treatment plant. The water is withdrawn from the wells, slightly chlorinated and then distributed to the public (Robinson, K., 2011). During a geotechnical soils analysis at the proposed project site conducted in December of 2010, no subsurface water was observed in any of the test trenches and based on information within the area the closest water table is in excess of 100 feet (TC Engineering, PC, 2010).

### 3.6.2 Environmental Consequences of the Proposed Project

There would be no direct impacts to aquifers from construction of the project, as it is not expected that any drilling or extensive excavating would be required at this site. During construction, there would be a minor potential for groundwater contamination to occur from the operation and maintenance of construction vehicles

and equipment (e.g., accidental fuel spills). The potential for contamination to occur would be minimized through the implementation of the facility's SWPPP and SPCC Plan. Any potential impacts associated with the leaking of substances (i.e., fuels, oils, and other lubricants) into soils and entering groundwater aquifers would be avoided through the use of BMPs to prevent spills or leaks. The chance of spills reaching the groundwater is unlikely as groundwater is over 100 feet below the surface; however, the use of BMPs would be implemented regardless as a precaution.

Operation of the proposed plant would increase the City of Kanab's current water needs by 1,520 gpd for 30 days of operation and up to 3,250 gpd for 130 days of operation, which would be accommodated through the existing 16 wells. This represents 0.03 percent of the existing wells capacity for 30 days of operation and 0.06 percent for the 130 days of operation. Therefore, minor impacts to groundwater are expected to result from operation of the Pilot Plant. No specific information on the fluctuation of groundwater levels in the immediate vicinity of the project site is available; however, groundwater aquifers in the area are generally an abundant resource; therefore, minor impacts on groundwater levels would be expected. During operations, accidental spills of toxic substances, such as petroleum products, could be a potential source of groundwater contamination. As stated above, the potential for contamination to occur would be minimized through the implementation of the facility's SWPPP and SPCC Plan; therefore, a minor potential for groundwater contamination to occur would be expected.

Under the connected action, future operations up to 130 days per year may include the installation of an evaporation pond which would hold process wastewater. The pond would be designed based on the analysis of the wastewater from tests and the corresponding regulatory requirements. Typically these types of ponds are lined with High Density Polyethylene (HDPE) (Raju, A., 2011). HDPE liners combine high tensile strength and chemical resistance with excellent stress-crack resistance and low temperature properties for highly reliable containment. Chemically inert and resistant to most hydrocarbons, these liners are the industry standard for a wide range of applications such as landfill caps/closures, lagoon liners, and mining applications. Therefore, no impacts to groundwater resources would be expected.

Operation of the proposed plant under the connected action would increase the City of Kanab's current water needs by 3,250 gpd for 130 days of operation, which would be accommodated through the existing 15 wells. This represents 0.06 percent of the existing wells capacity and therefore would have a minor impact to groundwater. As the Pilot Plant would operate longer, the chance of accidental spills increases however as stated under the proposed project potential for contamination to occur would be minimized through the implementation of the facility's SWPPP and SPCC Plan; therefore, a minor potential for groundwater contamination to occur would be expected.

### 3.6.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the Pilot Plant would not occur at the site and impacts to groundwater would not occur as no additional withdrawal would be expected.

## 3.7 Materials and Waste

### 3.7.1 Existing Conditions

The primary process-related materials that would be utilized by the Pilot Plant include the feedstocks: coal and lignocellulosic biomass. Utah sub-bituminous or lignite coal would be utilized. In 2009, there were eight coal producing mines in Utah, which produced 21,718,000 tons. The average coal cost in the state was $32.32 per ton (EIA, 2009). Utah typically accounts for more than two percent of U.S. coal production. More than two-thirds of Utah's coal production is consumed for electricity generation within the state; the remainder is shipped by rail primarily to Nevada and California (EIA, 2011). Lignocellusosic biomass can come from a variety of sources including: agricultural residues (including corn stover and sugarcane bagasse), dedicated energy crops, wood residues (including sawmill and paper mill discards), and municipal paper waste.

Sand would be used in the process. In 2008 there were more than 48 active construction sand and gravel production operations in Utah ranking the state fifth in the Nation in terms of tonnage (41,226,000 tons) (USGS,

2010; USGS, 2010a). The process chemicals that would be required for the Pilot Plant consist of common water treatment and conditioning chemicals that are widely used in industry with broad regional and National availability. Large National suppliers of water and waste treatment chemicals include Ciba, Kemira, Nalco, and the SNF Group, among others. Propane would be used as fuel in the process, which would be supplied by Garkane Energy.

Wastes can generally be divided into three broad categories, including hazardous, nonhazardous, and universal wastes. A hazardous waste is a waste with properties that make it dangerous or potentially harmful to human health and/or the environment. Hazardous wastes are Federally regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901, et seq. Nonhazardous wastes are all wastes not classified as hazardous, which is typically thought of as residential or municipal waste. Universal wastes are certain hazardous wastes, e.g. batteries, which, when managed or recycled properly, are not included as hazardous waste.

Table 3.7-1 provides information on the solid waste landfills within approximately 60 miles of the project site, including 2009 waste receipt rates and available information regarding remaining capacities. It is important to note that the Kane County Landfill was permitted in May 2011 and is approximately one mile to the east of the project site. There are six commercial hazardous waste Treatment, Storage, and Disposal facilities in Utah: Ashland Chemical, Inc.; Chemical Demil; Clean Harbors Aragonite, LLC; Clean Harbors Clive, LLC; Clean Harbors Grassy Mountain, LLC; Deseret Chemical Depot (DCD); EnergySolutions, LLC; and Safety-Kleen – Pioneer Road (UDEQ, 2011).

**Table 3.7-1. Municipal Solid Waste Landfills Within Approximately 60 Miles of the Project Site**

| Landfill | County | 2009 Municipal Solid Waste Receipt (tons) | 2009 C&D Debris Waste Receipt (tons) | Remaining Capacity (tons) | Remaining Capacity (years) |
|---|---|---|---|---|---|
| Western Kane County Special Service District/Kanab MSW Landfill[1] | Kane | 5,000 | 0 | NA | 20 |
| Garfield Co/Johns Valley MSW Landfill[1] | Garfield | 6,350 | 720 | NA | NA |
| Garfield Co/Ticaboo MSW Landfill[1] | Garfield | 2,800 | 0 | NA | NA |
| Panguitch C/D Landfill | Garfield | 0 | 325 | 300 | 0 |
| Iron County MSW Landfill[1] | Iron | 34,537 | 8,195 | 1,829,560 | 38 |
| Iron Co/Parowan C/D Landfill[1] | Iron | 0 | 1,655 | 94,000 | 24 |
| Cedar City/Bulloch Pit C/D Landfill | Iron | 0 | 7,405 | NA | NA |
| Washington County MSW Landfill[1] | Washington | 143,619 | 11,305 | 322,000 | NA |

Source: UDEQ, 2011a and UDEQ, 2010a

[1] Each of these landfills accepts special waste as defined in UAC R315-301, including ash.

NA = Not Available; C&D = Construction and Demolition

### 3.7.2 Environmental Consequences of the Proposed Project

Pilot Plant construction materials would consist primarily of structural steel beams and steel piping, tanks, and valves. Locally obtained materials would include crushed stone, sand, and lumber for the proposed facilities.

Components of the facilities would also include concrete, ductwork, insulation, electrical cable, lighting fixtures, and transformers.

During construction minor amounts of typical construction refuse and debris would be generated and would need to be disposed of properly. Since no buildings or other structures currently exist at the site, no demolition would be necessary. The amount of municipal solid waste and construction debris generated during construction is anticipated to be minor and would not significantly affect the capacity of nearby disposal facilities (see Table 3.7-1 for details on nearby disposal facilities).

During construction, small amounts of potentially hazardous waste materials (e.g., waste oils, solvents, and paints) would be generated. Hazardous waste generated during construction would be properly managed and stored on site in accordance with RCRA regulations. Preventative measures, such as providing fencing around the construction site, establishing contained storage areas, responding immediately to spills, and controlling the flow of construction equipment and personnel would help reduce the potential for a release of hazardous materials to occur. The quantity and type of hazardous waste that would be generated during construction would be limited to typical construction-related waste streams commonly accepted by licensed Treatment, Storage, and Disposal facilities for hazardous waste, and commercially-available treatment or disposal would be available. Thus, impacts from hazardous waste disposal are expected to be minor.

Table 3.7-2 describes the materials that would be used in Pilot Plant processes and anticipated wastes. During operations, ample supplies of feedstocks and process materials would be available in the area. Coal use would represent a very small amount as compared to the production rate in Utah. Estimated amounts of lignocellulosic biomass to be used are not currently available; however, considering the wide variety of potential sources, it is not anticipated that supplies would be limited. Sand would serve as a substrate and not be consumed in the process. Utah is one of the top sand-producing states in the Nation; thus, sand availability would not be limited. Garkane Energy would supply propane to the site and would be capable of supporting operations. Process chemicals required would consist of common industrial chemicals with wide availability; thus, it is not expected that supplies would be limited.

**Table 3.7-2. Materials Required for Pilot Plant Operation and Anticipated Wastes**

| Item | Description |
|---|---|
| *Feedstocks and Process Materials* | |
| Coal | 5 tons per day; 150 tons for 30 days of operation; 650 tons for 130 days of operation. |
| Lignocellulosic Biomass | Agricultural residues (including corn stover and sugarcane bagasse), dedicated energy crops, wood residues (including sawmill and paper mill discards), and municipal paper waste. |
| Sand | Up to 300 tons for 30 days of operation, Up to 1,300 tons for 130 days of operation. |
| Propane | 660 gpd. 6,000 gallon capacity tank onsite (would be purchased from Garkane Energy). |
| ***Products and Wastes*** | |
| Ash and Fines Solid Waste | 1,166 pounds of ash per operational day. Total of 26 tons including fines for 30 days of testing. Total of 113 tpy, including fines, for possible future operations (up to 130 days per year). |
| Solid Waste | Up to 14.6 tpy. |

During operations, based on an estimated solid waste generation rate of 8.93 pounds per employee per day for industrial establishments (CalRecycle, 2011), the Pilot Plant would be expected to produce approximately 80 pounds of solid waste per day. This would amount to 14.6.which assumes waste generation for 365 days per year to provide a conservative estimate; however, the Pilot Plant would only be operated for a total of 30 days funded by DOE (or possibly up to 130 days per year for future operations). Thus, it is likely that the overall total would be considerably less assuming that general maintenance during non-operational periods would produce considerably less solid waste than during operations. Ashes and fines waste produced in the process (up to 26 tons for 30 days of testing; up to 113 tons for possible future operations of 130 days) would be considered a special waste as per Utah Administrative Code (UAC) R315-301 "Environmental Quality, Solid and Hazardous Waste – Solid Waste Authority, Definitions, and General Requirements" and Federal regulations (EPA, 2010).

The large amount of disposal capacity in the region is described in Table 3.7-1; even at 128 tons of waste requiring disposal under the connected action for 130 operational days per year [14.6 tpy of solid waste and 113 tpy of ashes and fines]) the Pilot Plant wastes would represent less than a one percent increase in solid waste receipt to regional landfills. Thus, impacts on disposal capacities would be minor.

Releases of hazardous materials to the environment are always a possibility when hazardous materials are in use or are produced at a facility. Viresco would develop appropriate spill response, pollution prevention, and emergency response plans to address the medical and environmental hazards associated with the Pilot Plant. The plans would include, at a minimum, a SWPPP and an emergency response plan. Spill response training would be provided to employees working with the hazardous materials stored and used on-site. In addition, protective measures, such as providing secondary containment around hazardous material storage areas, would be incorporated into the final design of the Pilot Plant as necessary and appropriate. These measures would be expected to minimize the potential for impacts from spills of hazardous materials. Should a spill happen, it would immediately be reported to the jurisdictional authorities and technically qualified hazardous material (HAZMAT) responders would be hired for the clean-up. These firms would be notified of the Pilot Plant's needs in advance of construction and would be secured under contract to respond in the event of a spill in a timely and professional manner (Viresco Energy, LLC, 2010).

The use of hazardous materials would result in the creation of hazardous wastes (e.g., oily rags), which would require proper disposal or recycling. Although the exact amount of hazardous waste generation is not known at this time, it is expected that the Pilot Plant would qualify as a Conditionally Exempt Small Quantity Generator (CESQG) of hazardous waste as defined by RCRA. A CESQG is defined as a facility that does not generate more than 220 pounds or 27 gallons of hazardous waste per month. As a CESQG, the Pilot Plant would be required to identify all the hazardous waste generated; not accumulate more than 2,200 pounds of hazardous waste at any time; and ensure that hazardous waste is delivered to a person or facility that is authorized to manage it (EPA, 2008). Considering that the Pilot Plant would be expected to generate relatively small amounts of hazardous wastes, no greater than minor impacts to hazardous waste Treatment, Storage, and Disposal facilities would be expected. In addition, the Pilot Plant would generate universal wastes, e.g. fluorescent light bulbs and batteries, which would be transported offsite to a licensed disposal facility.

### 3.7.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operations would not occur; therefore, there would be no changes in materials and waste generation and disposal characteristics in the area as compared to the existing condition.

## 3.8 Utilities

### 3.8.1 Existing Conditions

Potable water is currently supplied to the City of Kanab through 16 permitted groundwater wells and 6 springs located on BLM land. The 16 wells have a total water capacity of 3,604 gallons per minute, and the springs produce 65 gallons per minute. The City of Kanab also has four storage tanks that are capable of holding 5,000,000 gallons of potable water. Kanab City's drinking water is one of the best in the state. It has been filtered

through several hundreds of feet of Navajo Sandstone. The water meets both state and Federal drinking water standards and requires nominal treatment before it is made available to the public (City of Kanab, 2011).

Sewage collection and treatment services are provided by the City of Kanab through a sanitary sewer system and sewage lagoon system. The existing wastewater lines flow towards the southeast with the majority of flow converging near the intersection of 700 South and Main Street. The wastewater flow then continues south to wastewater lagoons near the Utah-Arizona border immediately west of the Kanab Airport. There are 4 wastewater lagoons which have a total capacity of 609,280 gpd. However, the City of Kanab currently utilizes only two of the lagoons which have a total capacity of 348,280 gpd. The City of Kanab has chosen as its service standard the criteria set forth in Administrative Rules for Design Requirements for Wastewater Collection, Treatment, and Disposal Systems (R317-3 of the Utah Administrative Code) (City of Kanab, 2006).

The City of Kanab, including the proposed project site, is furnished electricity by Garkane Energy. Garkane Energy has been incorporated since July 1938, with the first lines energized in December 1939. Garkane Energy serves over 12,700 customers spread over 16,000 square miles of southern Utah and northern Arizona (Garkane Energy, 2007 and Garkane Energy, 2009). As of 2009 Garkane Energy had over 2,168 miles of line, many of which traverse public lands (Parks, Monuments, National Forests, and BLM Lands etc.) (Garkane Energy, 2009).

Beginning in 1998, Garkane Energy began offering Propane Gas service. This service is currently employed by the City of Kanab. The propane division was spun off into an independent, wholly-owned subsidiary effective January 1, 2003. Garkane Propane, Inc. has grown to service over 1,900 customers through southern Utah and northern Arizona (Garkane Energy, 2007a).

The City of Kanab is supplied communication services consisting of local and long distance telephone service, cellular communications, Internet access, cable TV, and high-tech business communication solutions by South Central Communications (South Central Communications, 2005). South Central Communications is one of the largest employers and telecommunication companies in rural southern Utah. They were incorporated in 1955 and currently provide service to more than 20,000 customers (South Central Communications, 2005).

Water, sewer, and communications infrastructure were installed along Kaneplex Road (Figure 3-11), which borders the site to the north, for purposes of serving the Kane County Public Safety Facility currently under construction approximately 0.5 miles east of the proposed Pilot Plant site. As shown in Figure 2-2, water, sewer, and communication lines have been installed and are proposed to be utilized for the Pilot Plant. Electricity lines also currently exist along Kaneplex Road and a transformer substation is located immediately west of the site (Figure 3-12).

**Figure 3-11. Sanitary Sewer on Kaneplex Road at Proposed Pilot Plant Site (recently installed to serve Public Safety Facility)**

**Figure 3-12. Transformer Substation on Old Landfill Road adjacent to Proposed Pilot Plant Site**

### 3.8.2 Environmental Consequences of the Proposed Project

Because of the short construction duration (approximately four months), the demand on existing utilities services to support construction of the Pilot Plant would be minimal. Impacts to existing public utility systems are expected to be negligible during the construction period, as direct use of utilities would be limited to electrical lines. It is expected that temporary portable sanitary wastewater facilities would be provided and wastewater would be transported by commercial services for disposal. Potable water would be provided by temporary onsite

water tanks. Electrical power would be provided by temporary connections to nearby power lines and use of portable generators to operate construction tools and machinery.

Operation of the Pilot Plant would require connections to existing potable water, sewer, electrical, and communications lines. Connecting to these utilities would not require major upgrades to any existing public utility infrastructure. As discussed in Section 3.8.1, the necessary infrastructure needed for the Pilot Plant has been installed for the construction of the Kane County Public Service Facility. The proposed Pilot Plant would tie into these existing lines. Accessing the utilities would have a minor impact as the supply lines currently abut the project site along Kaneplex Road. As the utilities currently exist and would meet the Pilot Plants requirements; there are no needs for offsite utilities or associated right of ways.

The daily potable water demand from the Pilot Plant, when it is operational under the 30 days funded by DOE, would be limited to the needs of a workforce of 9 employees (approximately 250 gpd) and the process water requirement for the SHR (1,270 gpd), for a total of 1,520 gpd. This total daily rate represents 0.03 percent of the existing wells and spring capacity that supply the City of Kanab. Therefore, it is expected that the Pilot Plant demand for potable water would have a minor impact on capacity of the Kanab potable water system.

The daily sanitary wastewater generated from the Pilot Plant during operation would be approximately 250 gpd. The City of Kanab's existing sewer system would have the capacity to meet this demand without the need for upgrades. This total daily rate represents 0.07 percent of the two lagoons currently utilized by the City of Kanab. Therefore, it is expected that the wastewater generated by the Pilot Plant would have a minor impact on capacity of the Kanab wastewater system. Viresco obtained a will-serve letter from the City of Kanab dated October 13, 2010 (Appendix C) confirming that the City can and will furnish water and sewer service to the proposed Pilot (City of Kanab, 2010a).

Process wastewater from the Pilot Plant will be recycled for re-use within the plant. The process wastewater would flow onto a concrete catch-pad, then into a sump where it gets returned back to the coal slurry feed area for continued use. Therefore, process wastewater will have no impact to the City of Kanab's wastewater system.

Electricity would be supplied by Garkane Energy, which is expected to have adequate capacity to serve the Pilot Plant. Viresco obtained a will-serve letter from Garkane Energy on August 8, 2011 (Appendix C) stating with some improvements made to the existing electrical system Garkane Energy has the means to provide 225kW of electricity to the proposed Pilot Plant. The improvements include easements, necessary system improvements, and a 3 phase 12.5kV power line constructed and ran to the site. The implementation of these improvements would be connected actions for the proposed project. DOE anticipates that the improvements and easements would occur in existing disturbed areas or adjacent to existing rights-of-way, which would result in minimal impacts. The Pilot Plant would have a minor impact on Garkane Energy's ability to provide and distribute electricity.

The proposed Pilot Plant would utilize propane to fuel the boiler and regenerator, because natural gas is not available at the site. The propane would be delivered and stored on site in a 6,000 gallon tank. During operation the Pilot Plant would use approximately 660 gpd of propane; therefore, the propane stored on site in the 6,000 gallon tank would last nine days of testing. Viresco obtained a will-serve letter from Garkane Energy on June 15, 2011 (Appendix C) stating that they have a bulk facility located in the City of Kanab which can store up to 30,000 gallons of propane and, therefore, Garkane Energy has the ability to supply the proposed Pilot Plant with propane. The Pilot Plant would have a minor impact on Garkane Energy's ability to provide and distribute propane.

Under the connected action, future operations up to 130 days per year, the daily potable water demand from the Pilot Plant would be 3,250 gpd, representing 0.06 percent of the existing wells and spring capacity that supply the City of Kanab. Therefore, it is expected that the Pilot Plant demand for potable water would have a minor impact on capacity of the Kanab potable water system.

The daily sanitary wastewater generated from the Pilot Plant during operation would remain approximately 250 gpd under the connected action and would continue represents 0.07 percent of the two lagoons currently utilized

by the City of Kanab. Therefore, it is expected that the wastewater generated by the Pilot Plant under the connected action would have a minor impact on capacity of the Kanab wastewater system.

Process wastewater from the Pilot Plant under the connected action may continue to be recycled, sent to an evaporation pond or it may also be treated through the City of Kanab's wastewater system. The total daily rate would represent less than one percent of the two lagoons currently utilized by the City of Kanab. Therefore, it is expected that the process wastewater potentially generated by the Pilot Plant would have a minor impact on capacity of the Kanab wastewater system. Kanab's wastewater lagoons would have the capacity to meet this demand without the need for upgrades. The use of Kanab's wastewater system would be based on specifications and a defined sampling plan agreed upon between Viresco and the City of Kanab.

Electricity would continue to be supplied by Garkane Energy. Under the connected action the Pilot Plant would require an additional 40kW of electricity which is expected to have a minor impact on Garkane Energy's ability to provide and distribute electricity. The Pilot Plant would continue to utilize approximately 660 gpd of propane; as stated above Garkane Energy has a bulk facility located in the City of Kanab which can store up to 30,000 gallons of propane and, therefore, a minor impact on Garkane Energy's ability to provide and distribute propane.

### 3.8.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the Pilot Plant would not occur at the site; therefore, no impacts to public utilities would occur.

## 3.9 Public Health and Safety

### 3.9.1 Existing Conditions

***Sensitive Receptors and Noise***

During public scoping, several individuals raised concerns about the potential for noise impacts resulting from Pilot Plant construction and operations. The nearest public sensitive receptors to the proposed site are described below. The site is currently undeveloped property that has not been graded or prepared for construction. Site visits have been performed, the most recent in May 2011, and no signs of a past release are present at the site and no evidence was noted to indicate that hazardous or toxic materials are or have previously been disposed of or produced at the site.

For context purposes, Table 3.9-1 presents typical background daytime levels found throughout the U.S. under calm and still wind conditions, and Figure 3-13 shows typical sound levels of common noise sources.

The proposed site is located on property to be leased by Viresco on Kaneplex Road, which is used as an access road to the nearby Kane County Landfill and the county safety facility under construction. The closest sensitive receptors to the site are in a residential area over one mile to the northeast on S. Hopi Drive, which is separated from the project site by US 89A, a surface water feature (Kanab Creek), and the Kanab Airport. Predominant noise sources in the area are traffic on US 89A, aircraft associated with the Kanab Airport, and trucks traveling to and from the Kane County Landfill and safety facility site (under construction) located approximately 1 mile southeast of the site along Kaneplex Road. However, the area is relatively quiet with background sound levels assumed to be similar to a rural area or normal suburban residential area, or around 35 to 45 A-weighted decibels (dBA) (see Table 3.9-1).

**Table 3.9-1. Typical Nominal Background Sound Levels in Residential Communities**

| Description | Typical Range, dBA | Average, dBA |
|---|---|---|
| Very Quiet Rural or Remote Area | 26 to 30 | 28 |
| Very Quiet Suburban or Rural Area | 31 to 35 | 33 |
| Quiet Suburban Residential | 36 to 40 | 38 |
| Normal Suburban Residential | 41 to 45 | 43 |
| Urban Residential | 46 to 50 | 48 |
| Noisy Urban Residential | 51 to 55 | 53 |
| Very Noisy Urban Residential | 56 to 60 | 58 |

Source: EPA, 1971.
dBA, Decibel, A-weighted scale

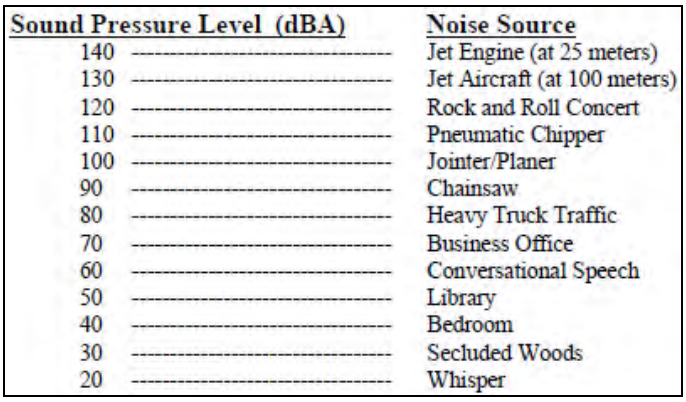



**Figure 3-13. Sound Levels of Common Noise Sources (MPCA, 1999)**

***Fire Protection***

Comments received during public scoping expressed concerns about the safety of the Pilot Plant and the ability of local fire protection and emergency services to respond to a potential fire, explosion, or release of hazardous material at the facility. The City of Kanab Fire Department was first organized in 1949 and has grown into a modern fire department which holds a primary response duty to over 4,300 citizens within its jurisdiction, covering an area over 14 square miles. The Department is staffed by a Fire Chief, Assistant Chief, 6 Captains, and fifteen firefighters. The Fire department is not only equipped to fight fires but they also perform Extrication, HAZMAT, Business Inspections, Pre-Planning of buildings, and Fire Code enforcement (City of Kanab, 2011a).

The Fire Department has two fire stations within the City limits of Kanab. The main station is located at 601 S 100E and the second station, called the Ranchos Station, is located on Powell Drive. The Ranchos Station is the closest to the proposed project site and houses the HAZMAT Operation Trailer (City of Kanab, 2011a). The Department is now a member of a mutual aid agreement between Kanab City, Long Valley Fire Department, East Zion Fire Department, and Cedar Mountain Fire Department as per a memorandum of understanding approved May 22, 2011 by the City of Kanab's Council (City of Kanab, 2011b). All these fire districts would participate in the region's mutual aid agreement and would assist in an emergency if called upon.

***Healthcare Services***

Public scoping comments raised concerns about the capacity of the local medical system to handle the potential injuries resulting from an accident at the Pilot Plant. The City of Kanab is served by the Kane County Hospital, which is located at 355 North Main Street in Kanab (Kane County Hospital, 2011). The Kane County Hospital has approximately 3 physicians, 3 physician assistants, over 100 employees and approximately 10 volunteers (Mary, 2011). This Medical Center contains a total of 25 beds. Based on the current population in the City of Kanab there are six beds per thousand people.

### 3.9.2 Environmental Consequences of the Proposed Project

Primary concerns to human health and safety would include chemicals stored onsite; potential injuries during construction and operation; potential air quality and noise impacts to public health; and the potential risk of an accident causing an ignition hazard.

Viresco would perform a Pre-Start-up Safety Review prior to construction and start-up of the facility to ensure the safest possible design and operations. Prevention is the first step in dealing with incidents where equipment, the environment, or personnel may be harmed by errors or accidents. For this reason the minimum requirements of the Occupational Safety and Health Association (OSHA) standards would be met or exceeded in the design of equipment, buildings, and access. Safety training shall also be given to employees and visitors (Viresco Energy, LLC, 2010).

Potential occupational health and safety risks during construction of the Plant are expected to be typical of risks for any other industrial/commercial construction sites. These include, but are not limited to: the movement of heavy objects, including construction equipment; slips, trips, and falls; the risk of fire or explosion from general construction activities (e.g., welding); and spills and exposures related to the storage and handling of chemicals and disposal of hazardous waste. The health and safety of construction workers would be protected by adherence to accepted work standards and regulations set forth by OSHA (29 CFR 1910, and 29 CF 1926).

During construction, safety measures such as providing fencing around the construction site, establishing contained storage areas, and controlling the movement of construction equipment and personnel would reduce the potential for an accident to occur. The proposed Pilot Plant would store a limited number of materials and chemicals which could potentially pose a health and safety risk to employees and surrounding communities. Should a spill happen it would immediately be reported to the jurisdictional authorities and technically qualified HAZMAT responders shall be hired for the cleanup. These firms shall be notified of the Pilot Plant's needs in advance of construction and shall be secured under contract to respond in the event of a spill in a timely and professional manner (Viresco Energy, LLC, 2010).

During the construction phase, noise would be localized, intermittent, and temporary. Nearby employees and residents could notice construction-related noise, but the resulting sound levels would be confined to daytime hours when most people are at work and away from home (i.e., between 7 a.m. and 5 p.m.). Increases in noise levels during construction would mainly result from the use of heavy construction equipment (e.g., bulldozers, dump trucks, and concrete mixers). Given the equipment needs of the construction phase, the typical noise levels onsite would be expected to be within the range of 60 to 90 dBA. Table 3.9-2 presents average noise levels from construction equipment typically used at industrial construction sites.

Based on the noise levels listed in Table 3.9-2, the overall sound level during construction of the Pilot Plant would be approximately 83 dBA at the source. To predict the noise impact on potential sensitive noise receptors, the 83-dBA noise level was projected from the proposed construction site to the closest residential property by applying general noise attenuation principles. The decrease in sound level from any single noise source normally follows the "inverse square law." That is, the sound level change is inversely proportional to the square distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of a distance produces a 6-dBA reduction in sound. Therefore, based on the 83-dBA sound level, it is expected that noise levels from the construction site would be approximately 30 dBA at 1,000 feet from the site, which is comparable to natural

background levels. These levels are not expected to result in significant noise impacts, as the closest receptors are located greater than 1,000 feet away from the site.

**Table 3.9-2. Common Equipment Sources and Measured Noise Levels at 50 feet**

| Equipment | Typical Noise Level in dBA |
|---|---|
| Backhoe Excavator | 85 |
| Bulldozer | 80 |
| Grader | 85 |
| Dump Truck | 91 |
| Pump | 76 |
| Compressor | 81 |

Source: Bolt et al., 1971

dBA = A-weighted decibels.

Equipment during operations are not expected to exceed construction levels and are therefore not expected to result in discernable incremental increases in noise levels at the nearest residential areas. Impacts would be no greater than those discussed under construction impacts. Using comparable sound levels shown in Table 3.9-2, it is assumed that a sound level of up to 81 dBA, equivalent to a compressor, could occur during operations. Therefore, using the inverse square law to estimate projected sound levels, a 25-dBA level would occur at approximately 1,000 feet, which is not expected to be audible at the closest receptors.

It is anticipated that the potential air quality impacts to public health would be minor as the air emissions from the Pilot Plant would primarily be limited to *de minimis* amounts of criteria pollutants. The facility would fall under the small source exemption (R307-401-9), which allows very small sources of air pollution more flexibility to make changes in their emissions as long as they remain eligible for the exemption. Section 3.5 describes impacts to air quality and the ambient air quality standards that represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare within a reasonable margin of safety.

Viresco would ensure that all restricted areas are clearly marked to indicate that access is restricted and that unauthorized presence within the area constitutes a breach of security. Adequate physical barriers to impede movement (i.e. fencing around the perimeter of the Pilot Plant and additional fencing around materials stored on site) would be put in place to prevent unauthorized access and protect public health and safety.

Major process operation failures have been considered in the engineering and design such that the system design is sufficiently flexible and conservative to help prevent such occurrences. An automated shutdown system would be designed into the process that would safely shut down the process should a piece of equipment fail (Viresco Energy, LLC, 2010). In case of a power outage, the system would be left in a safe state. Inflows to the gasifier and regenerator (coal slurry, steam, hydrogen, etc.) would stop, except for nitrogen purge. Lack of fluidizing feed gases would cause the fluidized beds in the gasifier and regenerator to slump. The nitrogen purge would sweep out the gases in the vessels. Syngas product line from the gasifier would vent to the flare. Regenerator exhaust gas would vent to the atmosphere. The flare would still operate. Heating of the boiler would stop along with steam production (Raju, A. 2011).

***Fire Protection***

As discussed above, the City of Kanab fire department is well staffed, and it is supported by three additional districts under a mutual aid agreement. Any of these fire departments would be available to assist in a fire emergency if needed. As per the conditional use permit, which was approved by the City of Kanab Planning Commission, the Pilot Plant's stack design must be submitted to the Kanab City Fire Chief for approval to ensure the fire suppression system to be installed is consistent with the applicable fire codes. Construction and operation

of the Pilot Plant would involve the use of flammable and combustible materials that pose an increased risk of fire or explosion at the proposed project site; however, the probability of a significant fire or explosion is very low. Furthermore, the site is surrounded by undeveloped lands for several hundred feet in all directions, which provides a substantial buffer area protecting the public from a potential catastrophic incident. The worst-case incident during operations would result from a rupture and explosion of the 6,000-gallon propane tank. Such occurrence would pose the greatest risk to employees onsite, but it would have no safety consequence to the surrounding community. The fire department within the City has the capacity, and is equipped to respond to a major fire or hazmat emergency at the proposed site if necessary. For comparison, Garkane Energy has a bulk capacity facility located in Kanab that can store approximately 30,000 gallons of liquid propane as stated in their will-serve letter (Appendix C). Any incidents that may occur during construction or operation would not increase the demand on fire protection services beyond the available capacity of currently existing services. The construction and operation of the Pilot Plant on the proposed project site would not displace any fire protection facilities, nor would it conflict with local and regional plans for fire protection services.

***Healthcare Services***

The potential for accidents and injuries to personnel during both construction and operation of the proposed Pilot Plant would be comparable to that of a small industrial facility and would not exceed the capacity of local healthcare services. The temporary construction jobs created by the proposed Pilot Plant could cause an influx of temporary residents to the City of Kanab. Currently the City has 6 hospital beds per thousand residents. The Hill-Burton standard is 4.5 hospital beds per thousand residents and the U.S. average as of 2007 was 2.7 hospital beds per thousand residents (Pearson, 2009). Should all of the temporary construction workers relocate to the City of Kanab, the reduction in healthcare capacity would be extremely small. The ratio of hospital beds per thousand residents would remain around 6 which is above the Hill-Burton standard and well above the U.S. average. The operation of the Pilot Plant would require nine full time employees who would likely live in Kanab or the general area. Should any employees relocate to the area it would be a relatively small number. Although the proposed project would increase the number of residents potentially requiring medical care, the ratio of hospital beds per thousand residents would remain at approximately 6 and, therefore, no impacts are expected.

> ***Hill Burton Act of 1946****: established the objective standard for the number of hospitals, beds, types of beds, and medical personnel needed for every 1,000 people. The Hill Burton standard is 4.5 beds per thousand residents (E-Notes, 2009).*

### 3.9.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operation of the Pilot Plant would not occur at the site and increased safety risks associated with the Pilot Plant would not occur. Additional air emissions and emergencies, such as accidental spills and injuries to workers, would not occur and, therefore, no impacts to the public health and safety would be expected.

## 3.10 Socioeconomics and Environmental Justice

### 3.10.1 Existing Conditions

The existing conditions for socioeconomics and environmental justice describe population, income, housing, and labor force characteristics in a comparative manner from the smallest geographic units in the immediate vicinity of the sites (census tracts and blocks, municipalities, or counties depending on the parameter reported) to increasingly larger geographic areas (municipalities, counties, states, and the United States depending on the parameter reported). This comparative approach provides a general idea of how characteristics immediately surrounding the site, which has the greatest potential to be impacted by the proposed project, relate to trends in larger geographic areas. This approach is particularly important to ascertain the potential for disproportionate adverse impacts to populations for environmental justice concerns.

The project site is located in the City of Kanab, Kane County, Utah. It is also located in Census Tract 1302, Block Group 1, and Block 1124. Census data reported in this section are mainly taken from the 2005 – 2009

American Community Survey 5-Year Estimates, though Census 2000 and Census 2010 data are reported in a few instances. Few data have been released in the region for the 2010 Census at this time.

#### 3.10.1.1 Population and Housing

Comparative population values for 2000 and 2010 are provided in Table 3.10-1. Overall, the population of the state of Utah increased at a considerably greater rate than the United States from 2000 to 2010 (23.8 percent for Utah compared to 9.7 percent for the U.S.). The populations of Kane County and the City of Kanab followed a similar pattern to the state; however, at a slower rate of increase. The 2010 population of the City of Kanab was 4,312, which represented approximately 61 percent of the Kane County population (7,125) (U.S. Census Bureau, Census 2000; U.S. Census Bureau, Census 2010).

**Table 3.10-1. Comparative Population (2000 – 2010)**

| Area | 2000 Population | 2010 Population | Percent Change (2000 – 2010) |
|---|---|---|---|
| United States | 281,421,906 | 308,745,538 | +9.7% |
| Utah | 2,233,169 | 2,763,885 | +23.8% |
| Kane County | 6,046 | 7,125 | +17.8% |
| City of Kanab | 3,564 | 4,312 | +21.0% |

Sources: U.S. Census Bureau, Census 2000; U.S. Census Bureau, Census 2010

Estimated average housing characteristics from 2005 through 2009 are provided in Table 3.10-2. Of Kane County's 4,763 housing units approximately 42.3 percent were vacant, which is a considerably higher rate than for the United States (11.8 percent) and Utah (9.5 percent), though the geographic areas closest to the site exhibited vacancy rates lower than the national or state rates (7.8 percent for Census Tract 1302 and 8.7 percent for the City of Kanab). The proportions of homes that were occupied by renters versus owners were similar for all geographic areas covered, though the national values show a greater tendency toward renter-occupancies. Median home values were similar among all of the geographic areas, though within Utah, values tended to be higher than for the United States except for the Kane County-wide median value of $181,100, which was slightly lower. Median contract rents within Kane County, Census Tract 1302, and the City of Kanab were considerably less than for the United States or Utah (U.S. Census Bureau, 2005 – 2009 American Community Survey 5-Year Estimates).

#### 3.10.1.2 Taxes and Revenue

The Utah individual income tax rate is a single rate of five percent for all income levels (Utah State Tax Commission, 2011). The City of Kanab's property tax rate can fluctuate from year to year (e.g., if property values decrease, rates increase); in 2010 the property tax rate was 1.0415 percent of assessed value (Johnson, 2011). The City of Kanab levies a seven-eighths percent sales tax on retail sales of tangible personal property, services, and meals (City of Kanab General Ordinances, Section 6-103).

**Table 3.10-2. Housing Characteristics (2005 – 2009 Estimated Averages)**

| Area | Housing Units | Vacancy Rate | Percentage Owner Occupied (of occupied units) | Percentage Renter Occupied (of occupied units) | Median Value | Median Contract Rent |
|---|---|---|---|---|---|---|
| United States | 127,699,712 | 11.8% | 66.9% | 33.1% | $185,400 | $675 |
| Utah | 919,334 | 9.5% | 72.0% | 28.0% | $208,100 | $656 |
| Kane County | 4,763 | 42.3% | 76.2% | 23.8% | $181,100 | $410 |
| Census Tract 1302 | 1,913 | 7.8% | 80.8% | 19.2% | $207,900 | $457 |
| City of Kanab | 1,717 | 8.7% | 78.4% | 21.6% | $197,600 | $457 |

Source: U.S. Census Bureau, 2005 – 2009 American Community Survey 5-Year Estimates

### 3.10.1.3 Economy and Employment

Estimated average labor force and income characteristics from 2005 through 2009 are provided in Table 3.10-3. During this period, the unemployment rates in the City of Kanab (1.4 percent), Census Tract 1302 (2.2 percent), and Kane County (3.0 percent) were considerably lower than in Utah (5.1 percent) and the United States (7.2 percent). The civilian labor force in Kane County consisted of 2,991 individuals, of which more than half were from Kanab (1,730). The per capita income in Kanab ($20,138) was lower than the other geographic areas, approximately 11 percent lower than Utah (U.S. Census Bureau, 2005 – 2009 American Community Survey 5-Year Estimates).

**Table 3.10-3. Estimated Labor Force and Income Characteristics (2005 – 2009 Estimated Averages)**

| Area | Civilian Labor Force | Percentage Unemployed | Per Capita Income |
|---|---|---|---|
| United States | 152,273,029 | 7.2% | $27,041 |
| Utah | 1,319,805 | 5.1% | $22,684 |
| Kane County | 2,991 | 3.0% | $24,515 |
| Census Tract 1302 | 1,933 | 2.2% | $28,478 |
| City of Kanab | 1,730 | 1.4% | $20,138 |

Source: U.S. Census Bureau, 2005 – 2009 American Community Survey 5-Year Estimates

The industries that provide the greatest number of jobs in Kane County include leisure and hospitality; government; trade, transportation, and utilities; and education, health, and social services. The major employers in Kane County include Best Friends Animal Sanctuary, Aramark (Lake Powell Resorts), Kane County Hospital, Kane County School District, Kane County Government, and the Federal Government (Economic Development Corporation of Utah, 2011).

### 3.10.1.4 Environmental Justice

Population composition and poverty status information is provided in Table 3.10-4. Data for Block Group 1 and Block 1124 (in which there was no population) are from the 2000 Census (more recent data were not available) and the remaining geographic areas are 2005 through 2009 estimated averages. The population composition in the area of the site was predominantly white alone with each of Census Tract 1302, Block Group 1, Kanab, and Kane County being at least 93.5 white alone. These proportions are greater than the state of Utah (89.6 percent) and considerably greater than the United States (74.5 percent). The proportions of Hispanics or Latinos in the

area of the site, at 2.3 to 3.7 percent for Block Group 1, Census Tract 1302, Kanab, and Kane County, were well below the averages for Utah (11.6 percent) and the United States (15.1 percent). The proportions of individuals and families with incomes below the poverty level in the area of the site were lower than the United States, with Kane County averages being roughly similar to those for the state of Utah. Poverty rates in the City of Kanab (9.0 percent for individuals and 6.4 percent for families) were lower than the rates for Kane County (10.6 percent for individuals and 8.0 percent for families) and Utah (10.4 percent for individuals and 7.2 percent for families) (U.S. Census Bureau, Census 2000; U.S. Census Bureau, 2005 – 2009 American Community Survey 5-Year Estimates).

**Table 3.10-4. Population Composition and Poverty Status (2000 – 2009)**

| Parameter | Census Tract 1302, Block Group 1, Block 1124[a] | Census Tract 1302, Block Group 1[a] | Census Tract 1302[b] | City of Kanab[b] | Kane County[b] | Utah[b] | United States[b] |
|---|---|---|---|---|---|---|---|
| Population Proportion White Alone | 0% | 96.7% | 94.1% | 93.5% | 95.5% | 89.6% | 74.5% |
| Population Proportion Black or African American Alone | 0% | 0.08% | 0% | 0% | <0.1% | 1.0% | 12.4% |
| Population Proportion American Indian and Alaska Native Alone | 0% | 1.2% | 2.7% | 3.0% | 2.1% | 1.2% | 0.8% |
| Population Proportion Asian Alone | 0% | 0.1% | 0% | 0% | 0% | 2.0% | 4.4% |
| Population Proportion Other Minority Races and Multiple Races | 0% | 1.9% | 3.2% | 3.5% | 2.4% | 6.1% | 8.0% |
| Population Proportion Hispanic or Latino Ethnicity (of any race) | 0% | 2.3% | 3.7% | 3.7% | 3.2% | 11.6% | 15.1% |
| Proportion of Individuals with Incomes Below the Poverty Level | 0% | 4.5% | 8.6% | 9.0% | 10.6% | 10.4% | 13.5% |
| Proportion of Families with Incomes Below the Poverty Level | 0% | 4.2% | 5.8% | 6.4% | 8.0% | 7.2% | 9.9% |

Sources: U.S. Census Bureau, Census 2000; U.S. Census Bureau, 2005 – 2009 American Community Survey 5-Year Estimates
[a] Data from Census 2000; more recent data not available.
[b] Data from 2005 – 2009 American Community Survey 5-Year Estimates

### 3.10.2 Environmental Consequences of the Proposed Project

#### 3.10.2.1 Population and Housing

During construction, approximately 25 construction jobs would be created as a result of the project. It is assumed that the majority of the workforce would be drawn from local candidates; therefore, no increase in population or need for housing is anticipated.

During operations, Viresco anticipates that nine employees would work onsite, five of which would be Viresco personnel and four would be contract employees. Viresco anticipates that employees would live in Kanab or the general area. Should any employees relocate to the area it would be a relatively small number (no more than nine employees) and negligible impacts on population and housing would be expected.

#### 3.10.2.2 Taxes and Revenue

During construction, construction workers are assumed to be currently employed, and residing and paying taxes in the Kane County area. Increased sales transactions for the purchase of materials and supplies would generate

some additional revenues for local and state governments, which would have a minor beneficial impact on taxes and revenue.

During operation, taxes would begin to be paid on the property, which would have a minor beneficial impact on taxes and revenue. Viresco anticipates that employees would live in Kanab or the general area. Thus, additional income taxes and property taxes could be collected by Kanab and the state if employees relocate to the area. Additional retail services and business employment may result if employees relocate to the area through a multiplier effect, yielding additional sales and income tax revenues for local and state governments. Also, operation of the facilities would require the purchase of supplies, equipment, and services in the local area, benefiting local businesses and increasing tax revenue. A minor beneficial impact would be expected.

#### 3.10.2.3 Economy and Employment

During construction, regional economic activity would increase as local construction contractors and construction firms are hired for the project. The purchase of building materials, construction supplies and construction equipment, as well as spending by the construction workers, would add income to the economy. Twenty-five construction jobs would be created as a result of the project. This would have a short-term, minor beneficial impact on employment in the Kane County area.

During operations, daily spending by employees would positively affect businesses in the area. These expenditures commonly include gasoline, automobile servicing, food and beverages, laundry, and other retail purchases undertaken in the immediate area because of convenience and access during the course of the business day. In addition, secondary jobs related to the increased economic activity stimulated by the project may also be created. This would have a minor beneficial impact on employment in the Kane County area; as relatively few (nine) operational employees would be required.

Major outdoor recreational opportunities exist in the area in the form of protected public lands, which are a major source of economic activity in Kane County in the form of tourism. Numerous public comments were received expressing concerns about the potential for the Pilot Plant to affect the desirability of these recreational resources and thus reduce the important income generated by tourism. The Economic Development Corporation of Utah notes the following as the major recreational opportunities in Kane County: Grand Staircase-Escalante National Monument, Bryce Canyon, Zion Canyon, Grand Canyon, and Kodachrome and Pink Coral Sand Dune State Parks (Economic Development Corporation of Utah, 2011). The closest of these to the project site is Grand Staircase-Escalante National Monument's far southwestern boundary, which terminates approximately nine miles to the east of the site. Pink Coral Sand Dune State Park is approximately 10 miles to the west with a mountain range in between. It is highly unlikely that the presence of the proposed facility would disrupt the enjoyment of these recreational locations or associated local economic activity considering the relatively small size of the proposed facility (1.5 acres at a maximum of 72 feet in height) and the distances of the recreational lands from the site. As described in Section 3.5, air emissions from the proposed Pilot Plant would not adversely impact Class I areas. Although plant structures would be visible from US 89A and parts of the City of Kanab, particularly the Kanab Creek Ranchos neighborhood, the Pilot Plant would be located in proximity to the Kanab Municipal Airport, the Kane County Public Safety Facility, the Kane County Landfill, and existing communication towers, which are already visible from the same locations and have not detracted from regional tourism.

In a report titled "Prosperity in the 21st Century West – the Role of Protected Public Lands", the Sonoran Institute (2004), stated that diverse economies with an educated workforce employed in knowledge-based service industries (e.g., engineering, management consulting, finance, etc.) are in the best positions to take advantage of nearby protected public lands from an economic standpoint. The fastest growth in the west has occurred where the predominant occupation is a white collar job, while the slowest growth has been where the economy depends on resource-dependent industries (e.g., agriculture and mining). Overall, the more diverse an economy, the faster it will grow, and the more specialized, the slower it will grow. Since 1970, in western states, the greatest source of real income growth has been non-labor income (e.g., investment income often associated with retirees) while the second greatest source has been growth in service-related income. Jobs in these industries are a mix that includes high-wage occupations in engineering, health, and business services, but also relatively low-wage

occupations such as those found in restaurants and hotels. Since most of the growth in the rural west is in services, the success of rural communities depends in large part on their ability to go beyond lower-paid tourism jobs and attract higher wage services. Protected public lands draw people employed in such higher wage services (Sonoran Institute, 2004).

Development of the Pilot Plant would create nine new jobs in the Kanab and Kane County area in the high-wage service industry (engineering). Considering that the major employers in Kane County include Best Friends Animal Sanctuary, Aramark (Lake Powell Resorts), Kane County Hospital, Kane County School District, Kane County Government, and the Federal Government (Economic Development Corporation of Utah, 2011), development of the Pilot Plant would help diversify the existing local service industry. A more diverse local service economy could help leverage Kanab and Kane County's proximity to nearby protected public lands (e.g., Grand Staircase-Escalante National Monument) into further diversification and overall economic growth.

#### 3.10.2.4 Environmental Justice

As described in Section 3.10.1.4, the population compositions of Kane County, Kanab, Census Tract 1302, Block Group 1, and Block 1124 consist predominantly of white alone individuals. The minority compositions of these areas are less than the state of Utah and considerably less than the United States. The proportions of individuals and families with incomes below the poverty level are generally less than or similar to the values for the state of Utah and considerably less than the United States. Furthermore, the immediate project site is widely separated by distance from local residential areas. Therefore, any adverse consequences of construction or operation of the project would not disproportionately affect minority or low income populations, and no environmental justice impacts would occur.

### 3.10.3 Environmental Consequences of the No Action Alternative

Under the No Action Alternative, construction and operations would not occur; therefore, there would be no changes to socioeconomics or environmental justice concerns as compared to the existing condition. Minor beneficial impacts to economic activity that would be associated with the proposed project would not be realized.

## 4.0 CUMULATIVE IMPACTS

The CEQ regulations implementing NEPA require the consideration of cumulative impacts as part of the review process (40 CFR 1508.7):

*"Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time."*

This section analyzes potential cumulative impacts to selected resource areas described throughout Chapter 3. The effects associated with the proposed project are analyzed in combination for their incremental contribution to cumulative effects when added to impacts from other planned and reasonably foreseeable actions. For an affected resource area, each reasonably foreseeable future action, including the Proposed Action, adds an increment to the total (cumulative) impact. For this analysis, the past and present effects are accounted for in the existing baseline of the affected environment section of this EA.

### 4.1 Existing and Reasonably Foreseeable Projects

For future actions to be relevant to the cumulative effects analysis, the actions must affect resources (be the cause of some type of effect whether beneficial or adverse) within the region of influence for the analysis. There are a few plans for development projects in the area of the proposed project site; most notable are plans to continue with the development of the Jackson Flat Water Supply Storage Project, which would consist of the construction of a dam embankment, water supply pipeline, water storage area (i.e. reservoir), and pump station. Below is a description of the Jackson Flat Water Supply Storage Project as well as other reasonably foreseeable projects.

***Jackson Flat Water Supply Storage Project***

The proposed project would include the construction of a dam embankment, water supply pipeline, water storage area, and pump station. The water supply pipeline, some of which is existing, would traverse through Sections 16, 21, 27, 28, and 33 of T43S R6W and Sections 3 and 4 of T44S R6W. The proposed storage facility (dam, water storage area, and pump station) would be an off-stream site, located mainly in Section 3 T44S R6W with water storage extending slightly into Section 10 T44S R6W. The proposed dam height of about 42 feet would retain 3,660 acre feet (AF) of water, inundating 212 acres. An additional 270 AF of storage would be provided due to excavation of materials for construction of the dam, for a total storage volume of 3,930 AF. The high water level would be at an elevation of 4,884 feet. During off-peak use times, the water storage facility would be filled using the existing pressurized irrigation system main line connecting to the proposed pipeline. During peak use times, the system would be able to draw water from the source (Kanab Creek) and the water storage facility at the same time. "Peak use times" indicates the dry summer months when water needed to irrigate land is highest.

***Kane County Public Safety Facility***

The proposed project would be located in Section 10, T.44S., R.6W., Salt Lake Base and Meridian containing approximately 18.57 acres. The site is accessed by a gravel road which leads to the Kaneplex, and to the Kane County Landfill. The proposed project would consist of the construction and operation of a public safety facility to include a 200 bed jail, sheriff's office, and related office space that potentially could include space for the Utah Highway Patrol, Kanab City Police Department, and the Driver License Division, as well as a parking lot and other ancillary facilities. Underground and overhead utility service lines would be brought to the site. An existing county road would provide access directly to the proposed facility.

Other than those mentioned above, DOE is not aware of any other known or anticipated projects in or around the area of the proposed project.

## 4.2 Cumulative Impacts

### 4.2.1 Land Use

Construction and operation of the proposed project in combination with the Kane County Public Safety Facility could adversely impact uses of recreational areas associated with the Jackson Flat Water Supply Storage Project. Both facilities would represent obstructions to natural views from the recreational areas. Each of these three development projects would represent obstructions to residential development in the area by removing usable land from development consideration and make the surrounding area less desirable for residential use.

### 4.2.2 Aesthetics

Construction and operation of the proposed project in combination with the Kane County Public Safety Facility could adversely impact views from the recreational areas associated with the Jackson Flat Water Supply Storage Project and, to a lesser extent, residences to the northwest of the Pilot Plant site. Both facilities would represent obstructions to natural views, primarily from the recreational areas.

### 4.2.3 Geology and Soils

Approximately 1.5 acres of soils would be disturbed by development of the Pilot Plant and the majority of this land area would consist of impervious surfaces including a road and parking lot. Onsite soil erosion would occur; however, implementation of a SWPPP and standard BMPs would minimize potential soil erosion impacts. It is not expected that the Kane County Public Safety Facility would cause much of a permanent impact on geology and soils aside from the creation of additional impervious surfaces over soils for the footprint of the building and associated parking lot, etc. The Jackson Flat Water Supply Storage project would have minor impacts on the soils to be inundated, as they would generally stay in place. Overall long-term cumulative impacts are expected to be minor, as soils otherwise would likely be disturbed from potential future development along Kaneplex Road.

### 4.2.4 Cultural Resources

Two cultural resources, both of which have been determined by SHPO to be not eligible for inclusion on the NRHP, are located entirely within the proposed project area. Neither resource extends beyond the proposed project area, and it is unlikely that any subsurface deposits, including human burials, are associated with either resource. The discovery of prehistoric human remains at an archaeological site investigated during the course of the Jackson Flat Water Supply Storage project, however, has heightened concerns among the Kaibab Band of Paiute Indians that human remains may be encountered during construction for the present project. If any human remains are discovered, then such a discovery could be viewed as a cumulative impact of the projects. The incremental and cumulative impacts of other planned and reasonably foreseeable projects, including the Kane County Public Safety Facility project, would be negligible.

### 4.2.5 Air Quality

The state of Utah takes into account the effects of all past, present, and reasonably foreseeable emissions during the development of the SIP. The state accounts for all significant stationary, area, and mobile emission sources in the development of this plan. Estimated emissions generated by the proposed project would be *de minimis*. Therefore, the proposed project would have minor adverse cumulative effects on air quality.

### 4.2.6 Greenhouse Gases (GHG) and Climate Change

According to the International Panel on Climate Change (IPCC) (2007a), a worldwide environmental issue is the likelihood of changes in the global climate as a consequence of global warming produced by increasing atmospheric concentrations of GHGs. The atmosphere allows a large percentage of incoming solar radiation to pass through to the earth's surface, where it is converted to heat energy (infrared radiation) that is more readily absorbed by GHGs such as CO2 and water vapor than incoming solar radiation. The heat energy absorbed near the earth's surface increases the temperature of the air, soil, and water.

GHGs include water vapor, CO2, methane, nitrous oxide, ozone, and several chlorofluorocarbons. The GHGs constitute a small percentage of the earth's atmosphere. Water vapor, a natural component of the atmosphere, is the most abundant GHG. The second-most abundant GHG is CO2, which remains in the atmosphere for long periods of time. Due to man's activities, atmospheric CO2 concentrations have increased approximately 35 percent over preindustrial levels. Fossil fuel burning is the primary contributor to increasing concentrations of CO2 (IPCC, 2007a).

According to the IPCC fourth assessment report, "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level" (IPCC, 2007b). The IPCC report finds that the global average surface temperature has increased by approximately 0.74 degrees Celsius (°C) in the last 100 years; global average sea level has risen approximately 150 millimeters over the same period; and cold days, cold nights, and frosts over most land areas have become less frequent during the past 50 years. The report concludes that most of the temperature increase since the middle of the twentieth century "is very likely due to the observed increase in anthropogenic [GHG] concentrations."

The IPCC 2007 report estimates that, at present, CO2 accounts for approximately 77 percent of the climate change potential attributable to anthropogenic releases of GHGs, with the vast majority (74 percent) of this CO2 coming from the combustion of fossil fuels. IPCC and the U.S. Climate Change Science Program (CCSP) examined the potential environmental impacts of climate change at global, national, and regional scales. IPCC's report states that, in addition to increases in global surface temperatures, the impacts of climate change on the global environment may include:

- More frequent heat waves, droughts, and fires.
- Rising sea levels and coastal flooding; melting glaciers, ice caps, and polar ice sheets.
- More severe hurricane activity and increases in frequency and intensity of severe precipitation.
- Spread of infectious diseases to new regions.
- Loss of wildlife habitats.
- Heart and respiratory ailments from higher concentrations of ground-level ozone (IPCC, 2007b).

On a national scale, average surface temperatures in the United States have increased, with the last decade being the warmest in more than a century of direct observations (CCSP, 2008). Impacts on the environment attributed to climate change that have been observed in North America include: • Extended periods of high fire risk and large increases in burned area. • Increased intensity, duration, and frequency of heat waves. • Decreased snow pack, increased winter and early spring flooding potentials, and reduced summer stream flows in the western mountains. • Increased stress on biological communities and habitat in coastal areas (IPCC, 2007b).

The U.S., and particularly southwest region where the proposed project would be located, has experienced locally severe economic damage, plus substantial ecosystem, social and cultural disruption from recent weather-related extremes, including hurricanes, other severe storms, floods, droughts, heat waves, and wildfires. Climate change will constrain the southwest's over-allocated water resources, increasing competition among agricultural, municipal, industrial and ecological uses. Hot temperatures and extreme weather are likely to cause increased adverse health impacts from heat-related mortality, pollution, storm-related fatalities and injuries, and infectious diseases. In the U.S. and particularly the southern states, disturbances such as wildfire and insect outbreaks are increasing and are likely to intensify in a warmer future with drier soils and longer growing seasons (IPCC 2007b).

Because climate change is a cumulative phenomenon produced by releases of GHGs from industry, agriculture, and land use changes around the world, it is generally accepted that any successful strategy to address it must rest on a global approach to controlling these emissions. In other words, imposing controls on one industry or in one

country is unlikely to be an effective strategy. And because GHGs remain in the atmosphere for a long time and industrial societies will continue to use fossil fuels for at least 25 to 50 years, climate change cannot be avoided. As IPCC report states, "[s]ocieties can respond to climate change by adapting to its impacts and by reducing [GHG] emissions (mitigation), thereby reducing the rate and magnitude of change" (IPCC, 2007b).

According to the IPCC, there is a wide array of adaptation options. While adaptation will be an important aspect of reducing societies' vulnerability to the impacts of climate change over the next two to three decades, "adaptation alone is not expected to cope with all the projected effects of climate change, especially not over the long term as most impacts increase in magnitude" (IPCC, 2007). Therefore, it will also be necessary to mitigate climate change by stabilizing the concentrations of GHGs in the atmosphere. Because these gases remain in the atmosphere for long periods of time, stabilizing their atmospheric concentrations will require societies to reduce their annual emissions. The stabilization concentration of a particular GHG is determined by the date that annual emissions of the gas start to decrease, the rate of decrease, and the persistence of the gas in the atmosphere. The IPCC report predicts the magnitude of climate change impacts for a range of scenarios based on different stabilization levels of GHGs. "Responding to climate change involves an iterative risk management process that includes both mitigation and adaptation, taking into account actual and avoided climate change damages, co-benefits, sustainability, equity, and attitudes to risk" (IPCC, 2007b).

During the demonstration period, the proposed project would contribute about 543 tons of GHG emissions to the atmosphere.

### 4.2.7 Groundwater

Development of the Pilot Plant would be expected to cause minor impacts to local groundwater resources primarily resulting from minimal amounts of potable and process water requirements to be supplied through the local public water supply system. In comparison to the anticipated demands on the public water system from the Kane County Public Safety Facility, the incremental demand by the Pilot Plant would be negligible. Therefore, cumulative impacts would not be substantially greater as a result of the proposed Pilot Plant project. A SWPPP would be implemented for each project to reduce the potential for stormwater runoff contaminated with toxic materials to infiltrate into the groundwater. Any potential impacts associated with the leaking of substances (i.e., fuels, oils, and other lubricants) into soils and entering groundwater aquifers would be avoided through the use of BMPs to prevent spills or leaks. The chance of spills or stormwater reaching the groundwater is unlikely due to the extreme depth groundwater is found; however, the use of BMPs would be implemented regardless as a precaution. The Kane County Public Safety Facility and Jackson Flat Water Supply Storage project would not be expected to further impact groundwater resources, as these projects would also follow NPDES guidelines to reduce the contamination of stormwater runoff and employ spill prevention measures.

### 4.2.8 Materials and Waste

Construction and operation of the proposed project in combination with the Kane County Public Safety Facility and Jackson Flat Water Supply Storage Project would cumulatively generate wastes that would require disposal, thus reducing the overall waste disposal capacities or regional waste disposal facilities. It is anticipated that the Pilot Plant's contribution to these impacts would be minor.

### 4.2.9 Utilities

It is expected that local utilities would be capable of supporting the needs of the Pilot Plant within existing capacities. Additional development projects in the area, such as the Kane County Public Safety Facility would result in additional needs for local utility services, which would cause a cumulative impact in terms of reducing currently available service capacities; however, it is expected that the Pilot Plant's incremental contribution would be minor in comparison. Over the long-term, as additional projects are implemented, local utility providers may need to upgrade existing service infrastructure in the area (e.g., replacing existing potable water supply pipelines with larger diameter pipelines and adding new electrical substations).

### 4.2.10 Public Health and Safety

No reasonably foreseeable actions have been identified that would interact with Viresco's proposed project to generate cumulative adverse impacts to human health and safety.

### 4.2.11 Socioeconomics and Environmental Justice

The proposed project would contribute to cumulative positive revenue impacts for the state, county, and local governments. Increased employment and associated economic growth that could be associated with the Kane County Public Safety Facility and Jackson Flat Water Supply Storage Project would contribute cumulatively to these positive impact.

## 4.3 Projects Not Considered for Cumulative Impacts

The impacts of the following activities are acknowledged and discussed qualitatively; however, because of various factors and uncertainties associated with them, the EA has not included these actions in the cumulative impacts analysis for the proposed project.

***Coal Mining***

The proposed project would obtain coal as a commercial commodity from existing mines principally within the state of Utah. The quantities required for the proposed 30 days of operation funded by DOE (150 tons) or the potential future 130 day annual operation (650 tpy) are trivial amounts of an abundant commodity that would not affect the economic feasibility of a coal mine or measurably change the pace of mining operations. No specific mine has been identified as a source of coal, and no new mines are intended to be developed specifically to support the project. The effects of commercial coal mining are generally well known and well described and are not within the scope of this EA. The proposed project does not aim to change mining techniques and, for the proposed project, DOE has no decisions that would affect coal mining techniques. It is assumed that the coal intended for the proposed project would be used as a feedstock for another facility in the event that the Pilot Plant is not constructed, because coal is an abundant and economical source of energy in the United States.

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# 5.0 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY; IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS;AND UNAVOIDABLE ADVERSE IMPACTS

## 5.1 The Relationship Between Local Short-term Uses of the Environment and the Maintenance and Enhancements of Long-Term Productivity

The CEQ regulations require consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). Construction and operation of the Pilot Plant would require short-term uses of land, coal, and other resources. These pertain to the activities that have been described throughout Chapters 3 and 4 and include such effects as: aesthetic impacts from the conversion of vegetated, undeveloped land to an industrial facility; impacts on air quality from fugitive dust emissions during construction and minor emissions from the Pilot Plant; erosion and sedimentation impacts, which generally would be mitigated through the use of control measures; loss of vegetation and wildlife habitat caused by land-clearing activities; impacts on the capacity of public utility services such as drinking water; impacts to water resources from the use of groundwater for process water needs; and traffic impacts attributable to the transport of personnel and materials to/from the site.

With respect to long-term productivity, the Proposed Action would support DOE's objective of demonstrating and promoting innovative technologies that can provide the nation with clean, reliable, and affordable energy while reducing reliance on foreign oil. The long-term benefit of the proposed project would be to demonstrate an innovative gasification process that needs no oxygen in order to gasify eliminating costly air separation units, uses wet feedstock, eliminating energy intensive drying steps, displays the ability to use waste streams as feedstocks, while demonstrating the potential for reduced capital costs and higher conversion efficiencies than conventional partial oxidation-based processes.

Following the test runs under the DOE cooperative agreement, Viresco plans to seek additional funding for continue operations. These operations would be limited by the funding available and would probably not exceed 130 days of operation in any year, including a possible 90-day continuous test run. Otherwise, at the end of the lease negotiated from SITLA, Viresco would be responsible for decommissioning the Plant, removing structures and equipment, reclaiming the site and re-vegetating it to resemble a habitat similar to the pre-disturbance conditions. The short-term use of the project site for the proposed Pilot Plant would not affect the long-term productivity of the project area. Project aspects that would enhance long-term productivity in the region include the direct, indirect, and induced creation of jobs and contribution to the economic output of the project area.

## 5.2 Irreversible and Irretrievable Commitments of Resources

The proposed project would commit Sec 10, T44S, R6W, Salt Lake base and meridian, SW4NW4NW4, Section 10, Kane County, Utah as the location for the Pilot Plant for the foreseeable future. Site preparation would include the grading of land to provide a developable site plan, which would impact vegetation and wildlife habitat. Although arguably these resources would be reclaimed in the future and would be revegetated to resemble similar pre-disturbance conditions, it is unlikely that they would be restored to their original conditions and functionality. Therefore, these commitments are considered irreversible.

> *A resource commitment is irreversible when primary or secondary impacts from its use limit future use options and irretrievable when its use or consumption is neither renewable nor recoverable for use by future generations.*

The implementation of the Proposed Action would potentially result in the irretrievable commitment of building materials for construction of the Pilot Plant. Construction and operation of the Plant would require the irretrievable commitment of energy and small quantities of feedstocks including coal and lignocellulosic biomass. Water resources used by the Pilot Plant would be treated and recycled in the process for reuse under the DOE cooperative agreement for 30 days of operation or possibly returned to the environment through an evaporation pond under future operations.

The implementation of the Proposed Action would require the commitment of financial resources by Viresco, its investors and lenders, and DOE for the construction, demonstration, and start-up of the Pilot Plant. However, these commitments are consistent with the purpose of and need for the Proposed Action as described in Chapter 1.

## 5.3 Unavoidable Adverse Impacts

Construction and operation of the proposed Pilot Plant would cause unavoidable air emissions. However, during construction particulate emissions would be controlled by using standard dust mitigation techniques (e.g., spraying of water over exposed soils), and air emissions from the Pilot Plant are considered minor and would not exceed significance thresholds. Adverse impacts during construction also include: the increase of stormwater runoff; the increase in construction traffic and associated noise and emissions, which would be localized impacts; and the use of construction materials, such as steel and concrete, which would be unavoidable, but would represent a small fraction of available materials. During operation, adverse impacts include the minor increase in traffic and associated noise and emission impacts from commuting personnel and the transport of materials and wastes; however, these impacts are expected to be minor as the estimated number of vehicles would be low. Adverse impacts from the increases in stormwater runoff and water pollutants due to additional impervious area would be reduced from adherence to stormwater management controls.

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## 7.0 LIST OF PREPARERS

| U.S. DOE – National Energy Technology Laboratory | | |
|---|---|---|
| Mr. Joseph Zambelli | NEPA Document Manager | |
| | | |
| PHE Environmental Team | | |
| *Analyst* | *Responsibilites* | *Degrees and Experience* |
| Joseph Grieshaber | Project Manager | M.B.A., Finance<br>M.S., Biology<br>B.S., Biology<br>34 years experience, 21 years NEPA experience |
| Stacey Schueler | Deputy Project Manager | B.S., Environmental Science<br>9 years of experience in site remediation, natural resource studies and NEPA documentation. |
| Debra Walker | QA/QC Manager | B.S., Biology<br>33 years experience, 20 years NEPA experience |
| Anthony Becker | Land Use, Aesthetics, and Socioeconomics and Environmental Justice | M.S., Biology<br>B.S., Biology<br>6 years NEPA experience |
| Jamie Martin-McNaughton | Sharepoint Administrator | B.S., Geology-Biology<br>8 years experience, 5 years NEPA experience |
| LPES, Inc. Environmental Team | | |
| Tim Lavallee | Air Quality | B.S. Mechanical Engineering<br>M.S. Environmental/Civil Engineering<br>20 years of experience, 14 years of NEPA experience |
| WSA, Inc. Environmental Team | | |
| John Ravesloot | Cultural Resources | Ph.D. Anthropology<br>M.A. Anthropology<br>B.A. Anthropology<br>32 years experience, 27 years NEPA experience. |

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# APPENDIX A

Consultation

Federal and State Agencies (A1), Native American Tribes (A2)

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# APPENDIX A1

Correspondence with Federal and State Agencies
USFWS, UT DNR, UT SHPO

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NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

December 1, 2010

Mr. Larry Crist
Field Supervisor
U.S. Fish & Wildlife Service
Utah Field Office
2369 Orton Cir, STE 50
West Valley City, UT 84119

Dear Mr. Crist:

The U. S. Department of Energy (DOE) is considering an action involving federal participation in the construction and operation of a pilot hydro-gasification plant to reduce coal and biomass into fuel in Kane County, Utah. The project is to be located at: Sec 10, T44S, R6W, Salt Lake base and meridian, SW4NW4NW4, Section 10, Kane County, Utah. This land is administered by the State of Utah, School & Institutional Trust Lands Administration. A description of the proposed project, site drawings and graphics depicting its location are provided as attachments.

As part of our coordination and consultation responsibilities, and to comply with Section 7 of the Endangered Species Act of 1973, as amended, we would appreciate receiving any information you have on wildlife resources, including endangered or threatened species or critical habitat, in the project area. Your thoughts on the potential impacts associated with the proposed project would also be appreciated.

Based on the nature and scale of the proposed pilot testing, DOE considers the proposed action to be one that would not significantly affect any endangered or threatened species or their habitat. We would appreciate a written response acknowledging your concurrence with DOE's assessment or indicating potential consequences that might result from the proposed action.

Should you require additional information, please contact me at the information provided below.

Sincerely,

NEPA Compliance Officer

☒ Concur No Effect
☐ Concur Not Likely to Adversely Affe
☐ No Comment
U.S.F.W.S. - Utah Field Supervisor
Date 1/3/11

Attachments

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
John.Ganz@netl.doe.gov • Voice (304) 285-5443 • Fax (304) 285-4403 • www.netl.doe.gov

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

April 13, 2011

Gary Bennett
Utah Department of Natural Resources
Division of Wildlife Resources
P.O. Box 606
Cedar City, UT 84720-0606

Dear Mr. Bennett:

The U.S. Department of Energy (DOE) is considering providing federal funding for the construction and testing of a pilot hydro-gasification plant to reduce coal and biomass into fuel in Kane County, Utah. The project is to be located at: Sec 10, T44S, R6W, Salt Lake base and meridian, SW4NW4NW4, Section 10, Kane County, Utah (see the attached Site Location Map). This land is administered by the State of Utah, School and Institutional Trust Lands Administration. A description of the proposed project, site drawings and graphics depicting its location are provided as attachments.

As part of our coordination and consultation responsibilities, and to comply with Section 7 of the Endangered Species Act of 1973, as amended, we contacted the U.S. Fish and Wildlife Service on December 1, 2010. As evidenced in the attached copy of our correspondence, the Utah Field Supervisor indicated that the project is expected to have “no effect” on federally listed species.

We would appreciate receiving any information you have on wildlife resources, including state-listed species or critical habitat, in the project area. Your thoughts on the potential impacts associated with the proposed project would also be appreciated. Based on the nature and scale of the proposed pilot testing, DOE considers the proposed action to be one that would not significantly affect any endangered or threatened species or their habitat.

We would appreciate a written response acknowledging your concurrence with DOE's assessment or indicating potential consequences that might result from the proposed action.

Should you require additional information, please contact me using the information provided below.

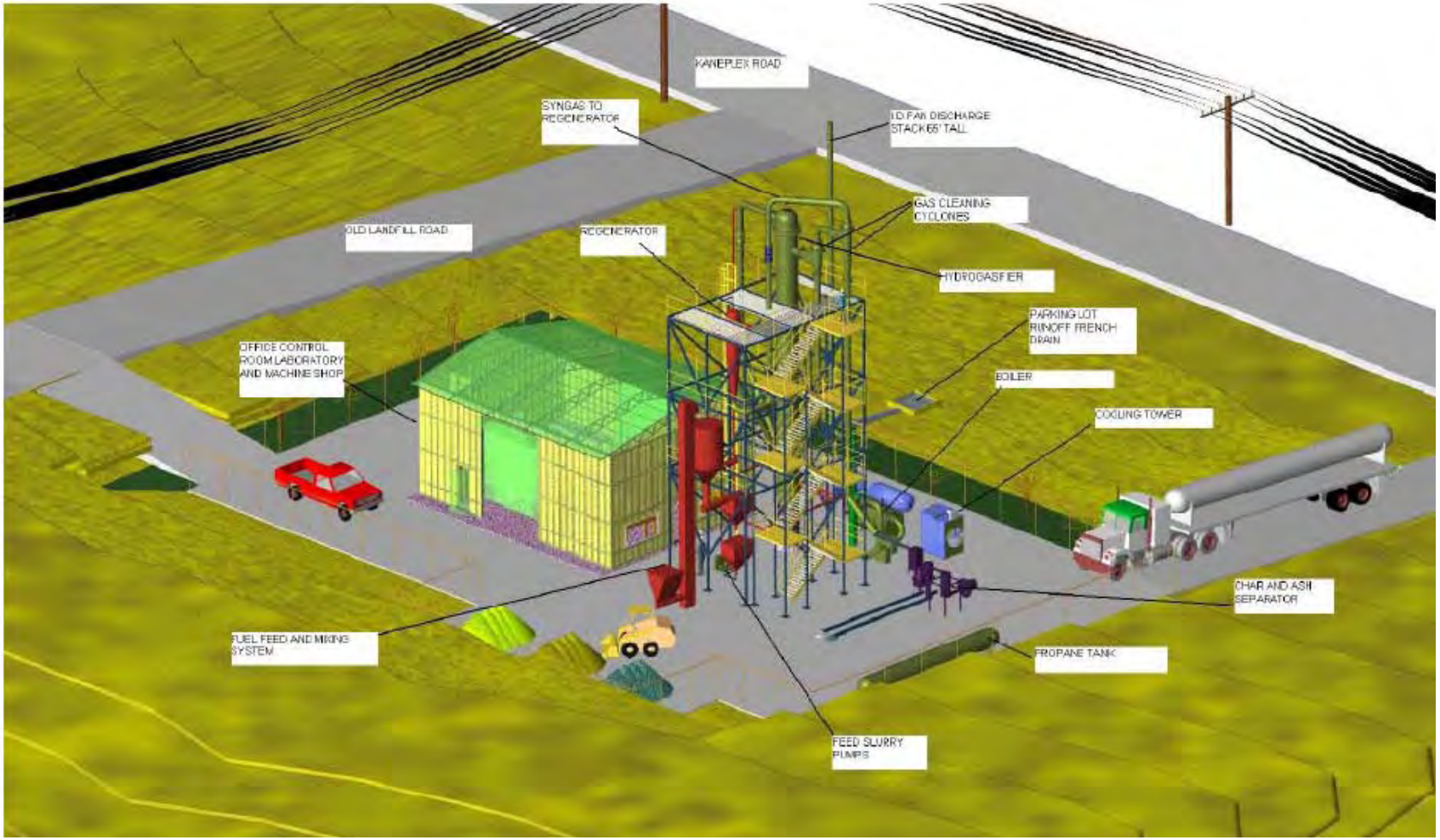
Mr. Joseph Zambelli
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
PO Box 880
M/S: B07
Morgantown, WV 26507-0880
Email: joseph.zambelli@netl.doe.gov
Phone: (304) 285-4913

Fax: (304) 285-4403

Sincerely,

Joseph Zambelli
NEPA Document Manager

Enclosures

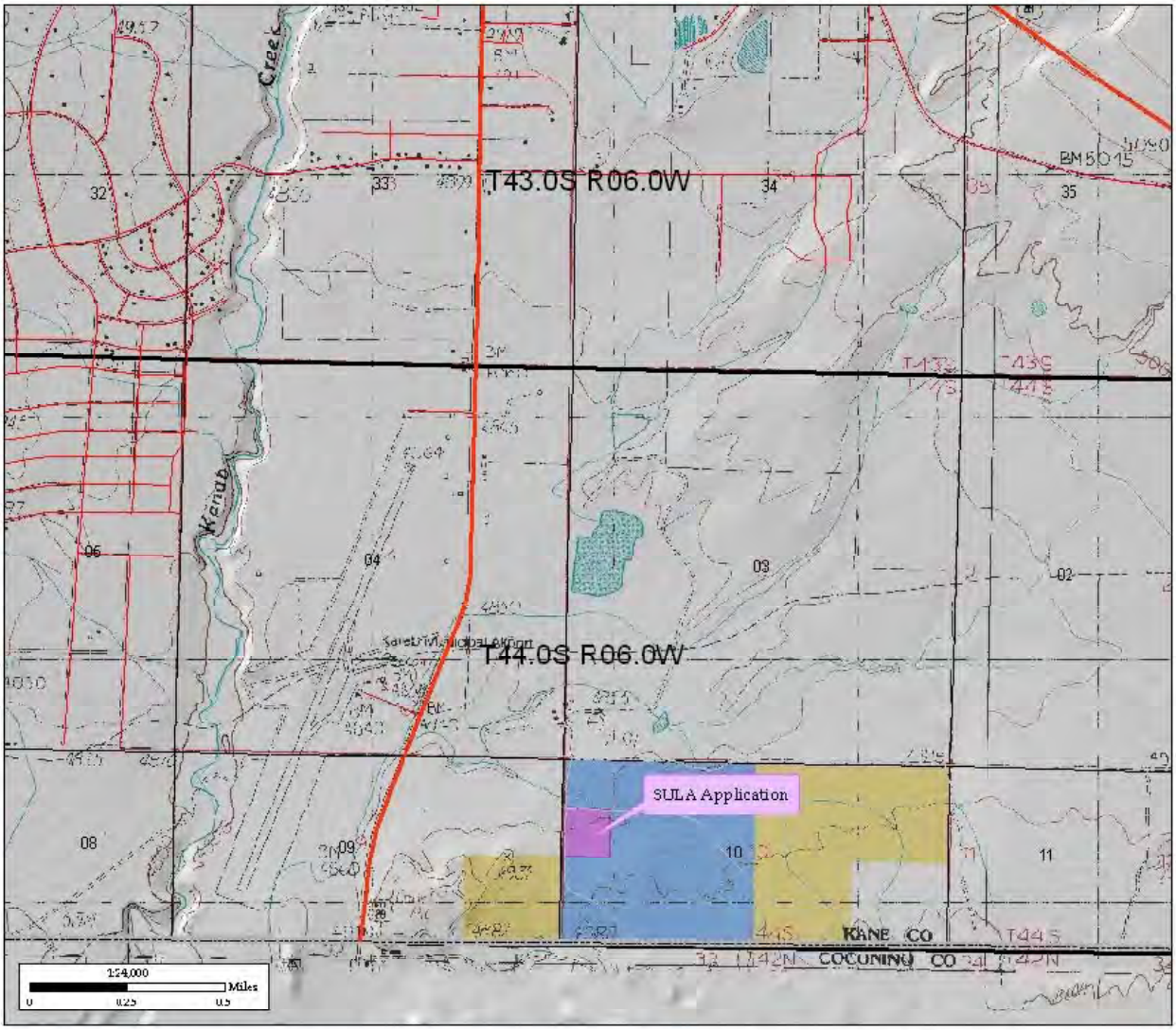


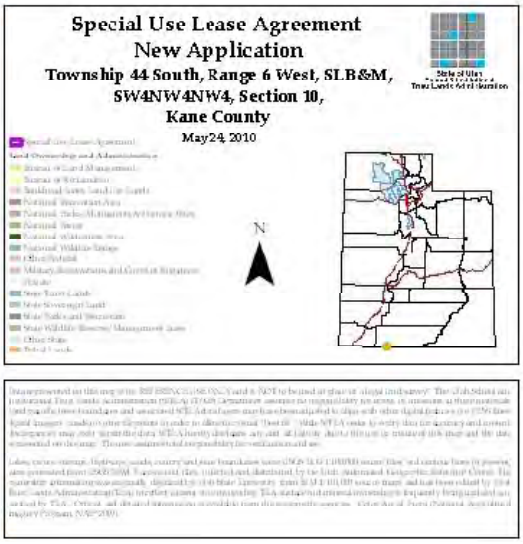

Conceptual View of Pilot Plant Looking Northwest

## Project Description

This project involves conducting a pilot-scale evaluation of the Steam Hydrogasification Reaction (SHR) process for converting carbonaceous feedstock such as coal and biomass into a clean, high-energy content product gas suitable for downstream production of a number of carbon-based fuels and chemicals including sulfur-free Fischer-Tropsch diesel, jet fuel, dimethyl ether and methane. Feedstocks to be used in this evaluation include a Utah sub-bituminous (and/or lignite) coal and at least one woody biomass material. The concept conceived is a fluid bed gasifier fluidized by steam and recycled hydrogen with sand as the primary bed material and a heat carrier connected by a standpipe and return line to a fluid bed regenerator (combustor) that heats the sand using char carbon and air. The pilot-scale gasifier to be constructed and operated in this project will have a feedstock throughput of up to 5 tons-per-day.

Field site preparation activities include minor excavation on 0.75 acres with a slope of 10 percent, utility trenching and installation of a concrete slab measuring 40 feet by 45 feet. A building will be erected on the slab. Exterior production structures and machinery will occupy an additional 5000 square feet. Maximum height is 67 feet. Stockpiles of sand, coal and biomass material will be stored onsite.






Site Location Map

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR · Morgantown, WV · Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

December 1, 2010

Mr. Larry Crist
Field Supervisor
U.S. Fish & Wildlife Service
Utah Field Office
2369 Orton Cir, STE 50
West Valley City, UT 84119

Dear Mr. Crist:

The U. S. Department of Energy (DOE) is considering an action involving federal participation in the construction and operation of a pilot hydro-gasification plant to reduce coal and biomass into fuel in Kane County, Utah. The project is to be located at: Sec 10, T44S, R6W, Salt Lake base and meridian, SW4NW4NW4, Section 10, Kane County, Utah. This land is administered by the State of Utah, School & Institutional Trust Lands Administration. A description of the proposed project, site drawings and graphics depicting its location are provided as attachments.

As part of our coordination and consultation responsibilities, and to comply with Section 7 of the Endangered Species Act of 1973, as amended, we would appreciate receiving any information you have on wildlife resources, including endangered or threatened species or critical habitat, in the project area. Your thoughts on the potential impacts associated with the proposed project would also be appreciated.

Based on the nature and scale of the proposed pilot testing, DOE considers the proposed action to be one that would not significantly affect any endangered or threatened species or their habitat. We would appreciate a written response acknowledging your concurrence with DOE's assessment or indicating potential consequences that might result from the proposed action.

Should you require additional information, please contact me at the information provided below.

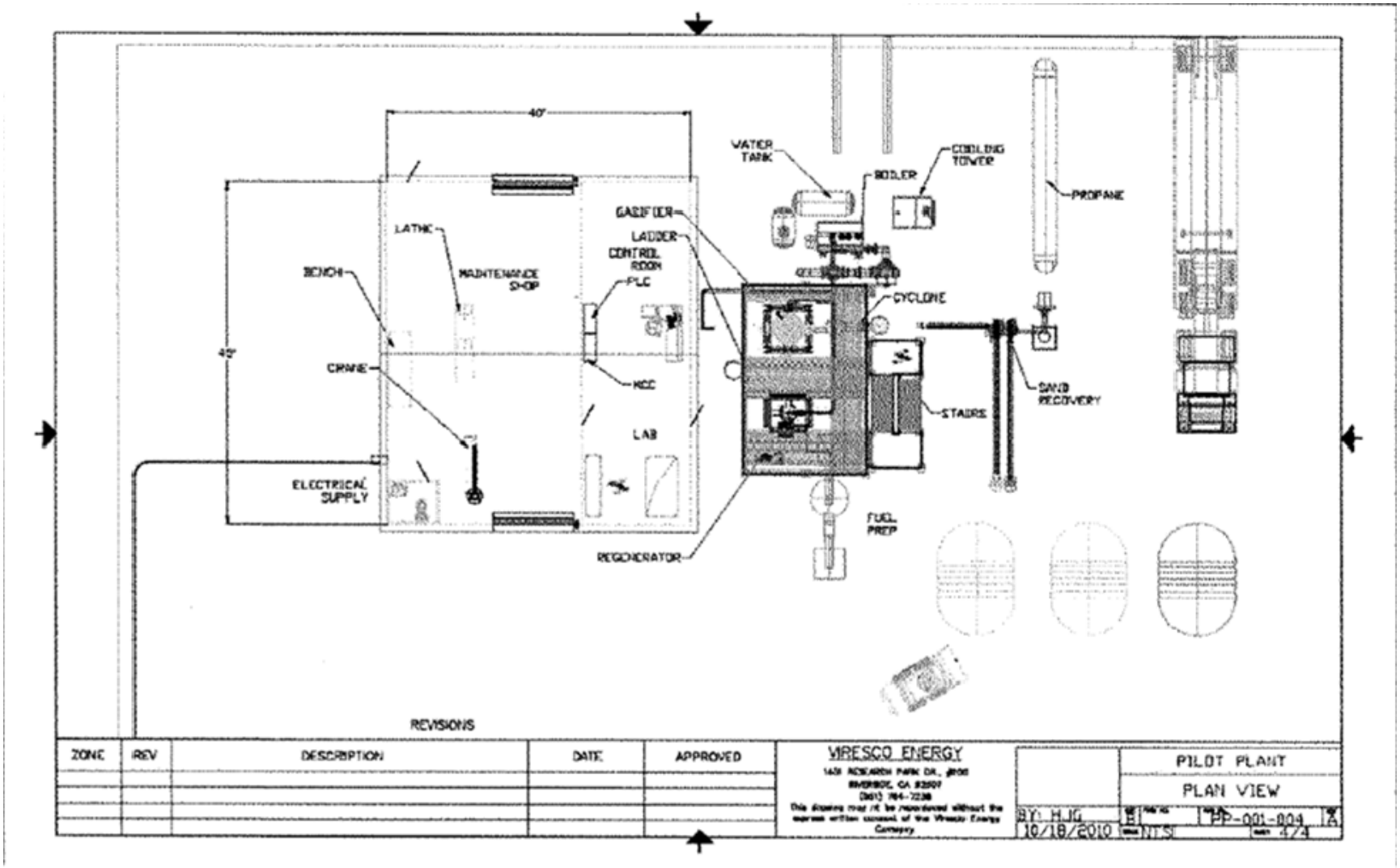
Sincerely,

NEPA Compliance Officer

☒ Concur No Effect
☐ Concur Not Likely to Adversely Affect
☐ No Comment

U.S.F.W.S. - Utah Field Supervisor
Date 1/3/11

Attachments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LADDER
CONTROL ROOM
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MCC
LAB
REGENERATOR
WATER TANK
BOILER
COOLING TOWER
PROPANE
CYCLONE
STAIRS
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FUEL PREP
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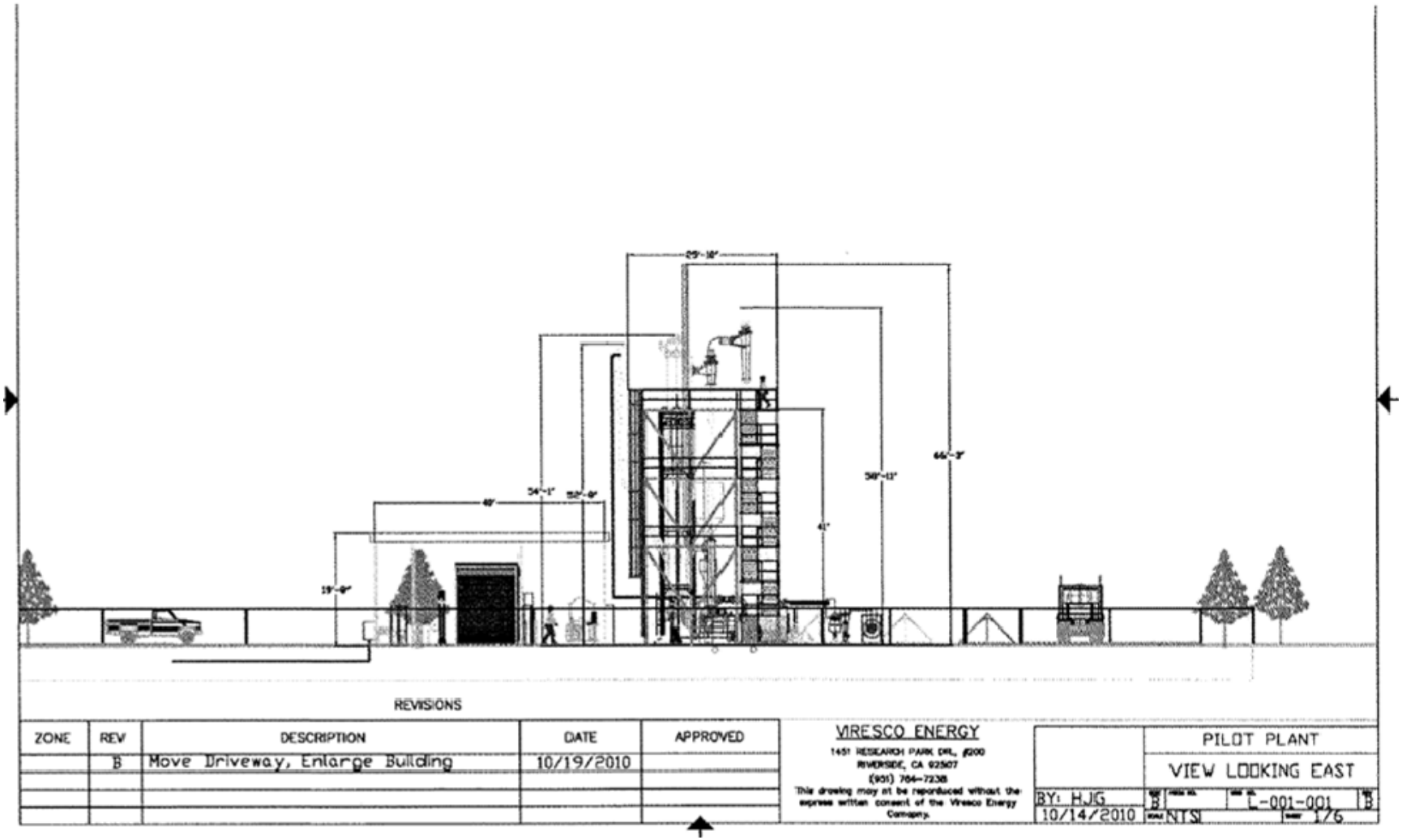
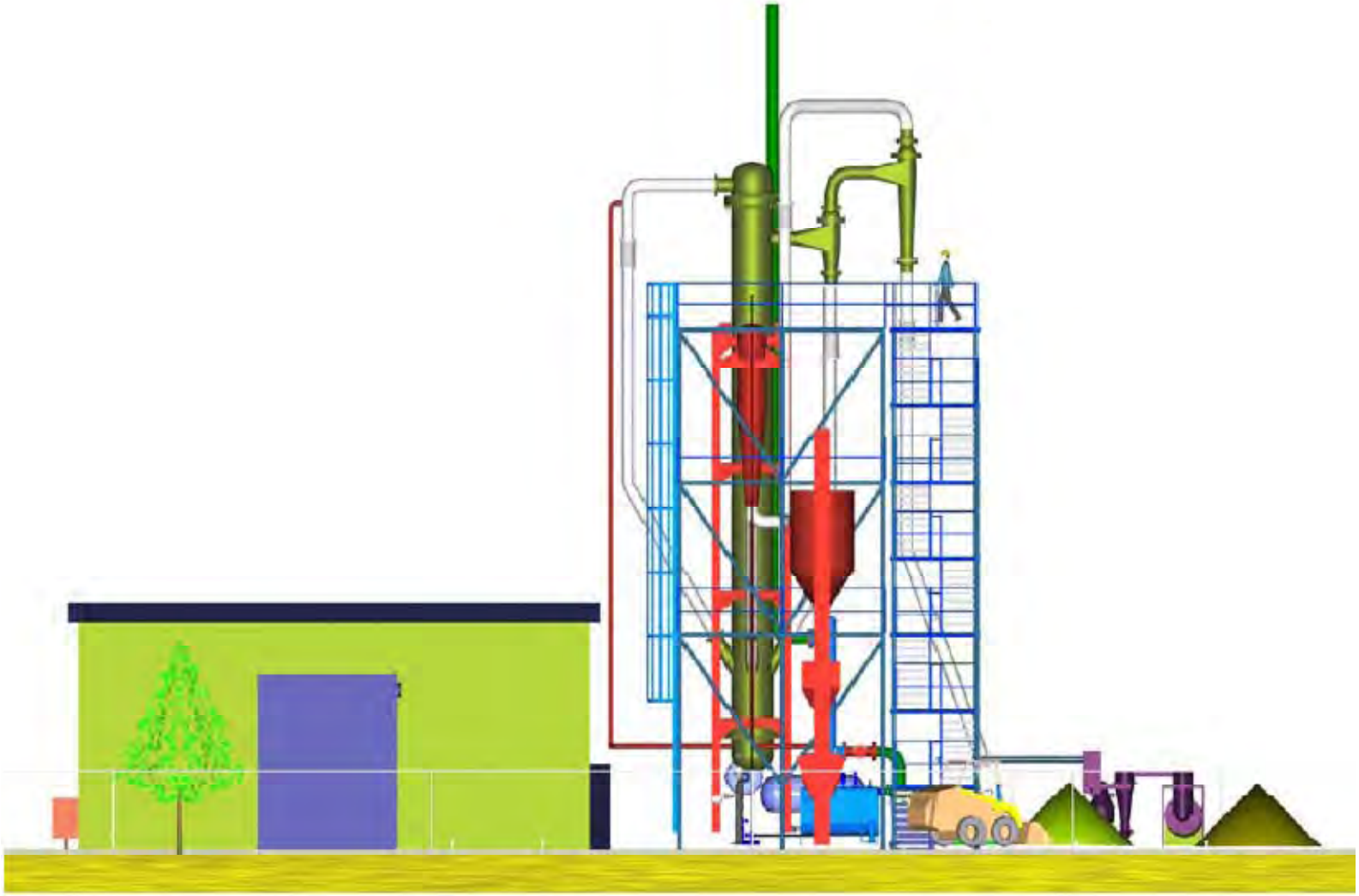
PLAN VIEW
BY: HJG
10/18/2010
NTS
PP-001-004
4/4

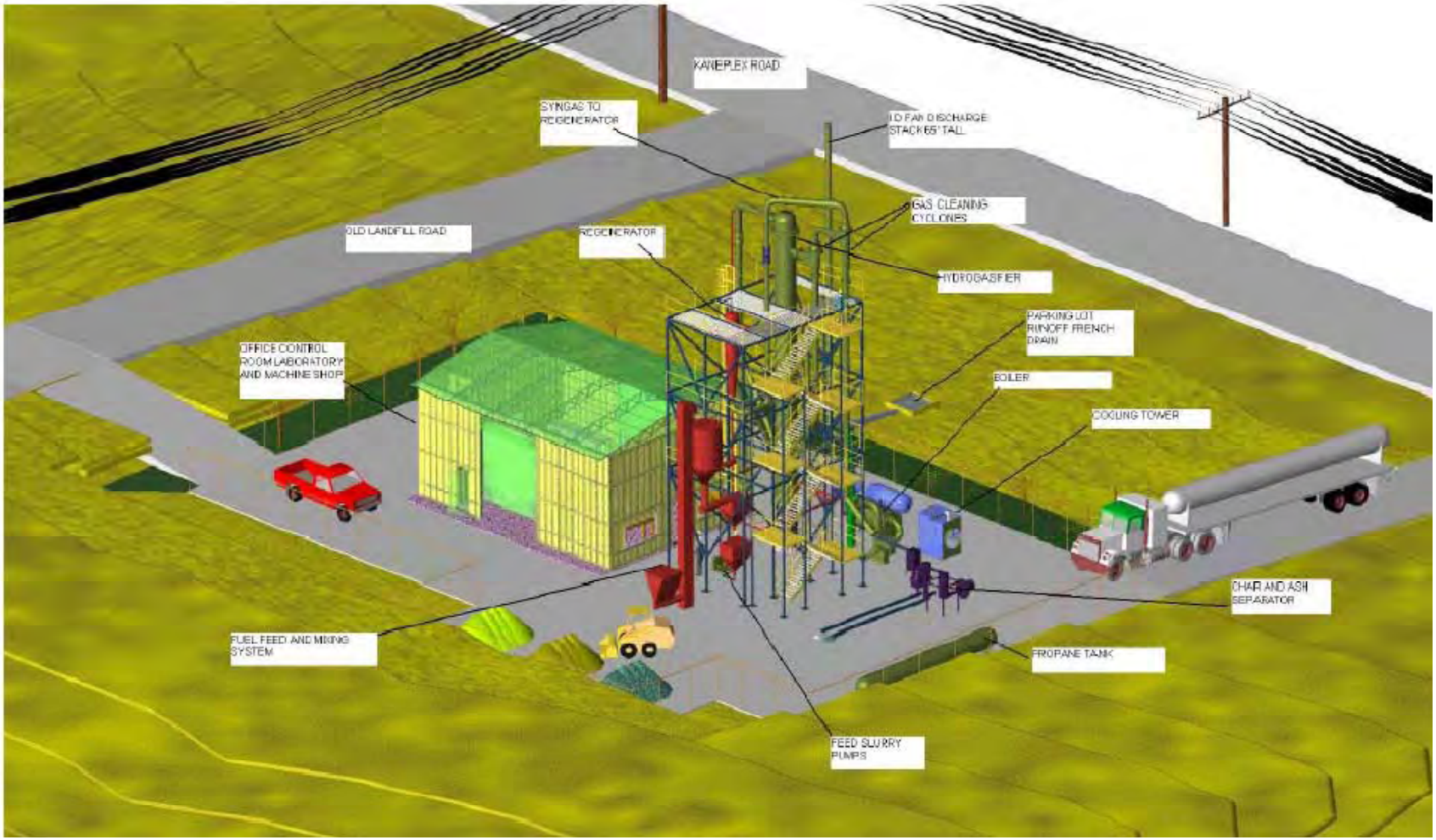
Plan View




View Looking East



View Looking East 2




View Looking Northwest

**From:** Carmen Bailey [carmenbailey@utah.gov]
**Sent:** Tuesday, June 28, 2011 11:06 AM
**To:** joseph.zambelli@netl.doe.gov
**Cc:** Gary Bezzant; Judy Edwards; Rhett Boswell; Sarah Lindsey
**Subject:** hydro-gasification plant

Mr. Zambelli,

Thank you for your letter informing us about the proposed hydro-gasification plant project. We cannot submit a concurrence letter on this project at this time but we can provide you a list of sensitive species in the project area if you make a data request with our Data Manager, Sarah Lindsey, at 801-538-4759. Please contact her with your project information and she can conduct a search for state and federally sensitive species provided to you in a letter.

The Utah Division of Wildlife Resources typically provides comments on impacts to wildlife after we have received a draft Environmental Assessment or project proposal.

Please feel free to contact me with any further questions.

Thank you, Carmen

Carmen Bailey
Impact Analysis Coordinator
Division of Wildlife Resources
Department of Natural Resources
1594 West North Temple, Suite 2110
Salt Lake City, UT 84114-6301
office (801) 538-4751, fax (801) 538-4745
cell (801) 718-5954
carmenbailey@utah.gov

JON M. HUNTSMAN, JR.
*Governor*

GARY R. HERBERT
*Lieutenant Governor*

# State of Utah

**DEPARTMENT OF NATURAL RESOURCES**

**MICHAEL R. STYLER**
*Executive Director*

**Division of Wildlife Resources**

**JAMES F. KARPOWITZ**
*Division Director*

July 6, 2011

Joseph Zambelli
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507

Subject: Species of Concern Near the Utah Coal & Biomass Fueled Hydro-gasification Pilot Plant Project

Dear Joseph Zambelli:

I am writing in response to your email dated June 28, 2011 regarding information on species of special concern proximal to the proposed Utah Coal & Biomass Fueled Hydro-gasification Pilot Plant Project to be located in Section 10 of Township 44 South, Range 6 West, SLB&M in Kane County, Utah.

The Utah Division of Wildlife Resources (UDWR) does not have records of occurrence for any threatened, endangered, or sensitive species within the project area noted above. However, in the vicinity there are historical records of occurrence for bald eagle, ferruginous hawk and southwestern willow flycatcher. All of the aforementioned species are included on the *Utah Sensitive Species List*.

The information provided in this letter is based on data existing in the Utah Division of Wildlife Resources' central database at the time of the request. It should not be regarded as a final statement on the occurrence of any species on or near the designated site, nor should it be considered a substitute for on-the-ground biological surveys. Moreover, because the Utah Division of Wildlife Resources' central database is continually updated, and because data requests are evaluated for the specific type of proposed action, any given response is only appropriate for its respective request.

In addition to the information you requested, other significant wildlife values might also be present on the designated site. Please contact UDWR's habitat manager for the southern region, Bruce Bonebrake, at (435) 865-6111 if you have any questions.

Please contact our office at (801) 538-4759 if you require further assistance.

Sincerely,

Sarah Lindsey

Sarah Lindsey
Information Manager
Utah Natural Heritage Program

cc: Bruce Bonebrake

1594 W. North Temple, Suite 2110, PO Box 146301, Salt Lake City, UT 84114-6301
telephone (801) 538-4700 • facsimile (801) 538-4709 • TTY (801) 538-7458 • *www.wildlife.utah.gov*

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

May 13, 2011

Lori Hunsaker
Deputy State Historic Preservation Officer
Utah Department of Community and Culture
300 South Rio Grande Street
Salt Lake City, UT 84101

Re: Kanab Steam Hydrogasification Pilot Plant

Dear Ms. Hunsaker:

Viresco Energy's proposed project, Kanab Steam Hydrogasification Pilot Plant (see attachment), which is on land managed by the Utah School and Institutional Trust Lands Administration (SITLA), requires compliance with 36 CFR Part 800.4(d)(1). Viresco Energy, LLC contracted Bighorn Archaeological Consultants, LLC to assist SITLA in fulfilling requirements under various federal and state environmental protection laws, including the National Historic Preservation Act (NHPA), the National Environmental Policy Act (NEPA), and the Utah Antiquities Act, and to perform an inventory of the proposed area of potential effect.

In September 2010 Bighorn conducted the inventory under Utah Project Authorization Number U10-O-0690s, and recorded two archaeological sites, 42KA6967 (a newly recorded open lithic scatter) and 42KA5613 (a previously recorded historic trash scatter). Bighorn prepared a report titled "*A Cultural Resource Inventory of the Proposed Kanab Steam Hydrogasification Pilot Plant, Kane County, Utah*" (Report Number 10-53) in which they considered both sites to be not eligible to the National Register of Historic Places. In late 2010 the report was submitted by Lisa Beck at SITLA to the Utah Department of Community and Culture State Historic Preservation Office (SHPO) as per the SHPO-SITLA cultural resources consultation Programmatic Agreement (SHPO Case No. 11-0075). As no eligible properties were located during the inventory, the SHPO did not provide a concurrence letter within 30 days, but per the Programmatic Agreement their concurrence was assumed by Lisa Beck at SITLA.

Because the U.S. Department of Energy (DOE) is considering an action to provide federal financial assistance to Viresco's project, DOE also has a responsibility to comply with NHPA and NEPA. Based on DOE's analysis of the report completed by Bighorn and events documented in this letter, DOE has determined that the proposed project will result in no historic properties affected. In compliance with 36 CFR Part 800.4(d)(1), the DOE asks the SHPO for its formal concurrence on this finding.

Sincerely,

Joseph Zambelli
NEPA Document Manager

Enclosure

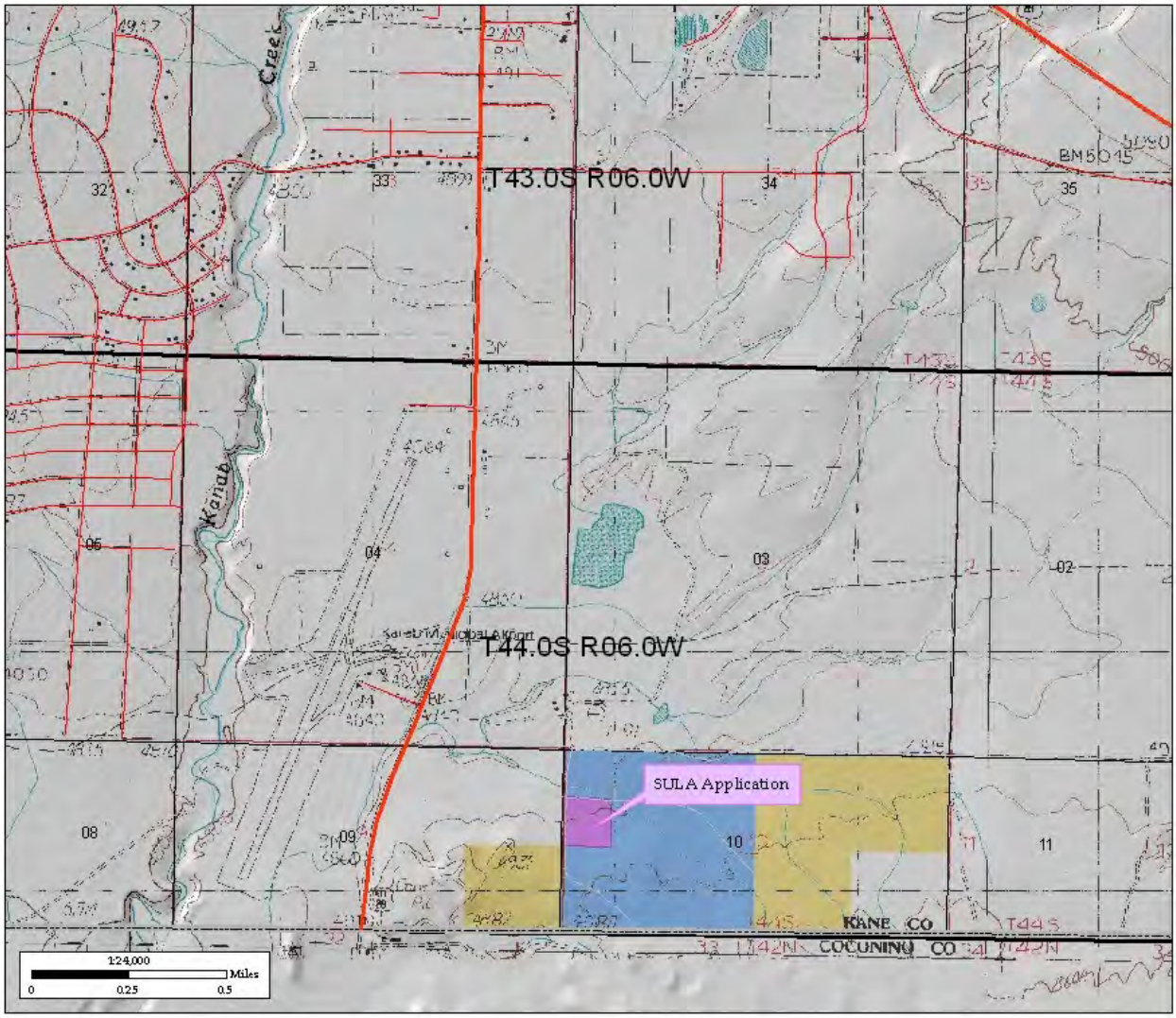
3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
joseph.zambelli@netl.doe.gov • Voice (304) 285-4913 • Fax (304) 285-4403 • www.netl.doe.gov

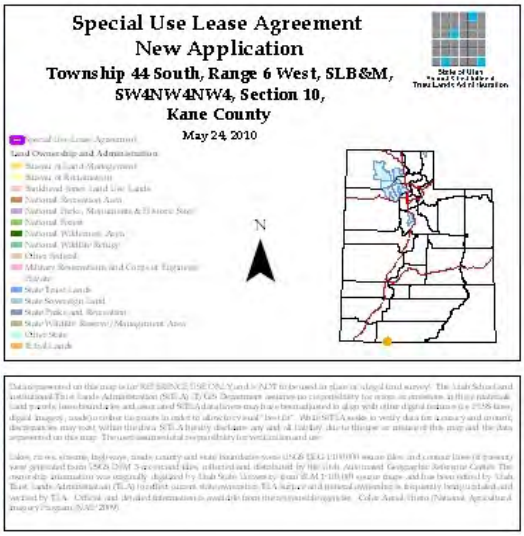
ATTACHMENT -- Project Description:

The project would be located at: Sec 10, T44S, R6W, Salt Lake base and meridian, SW4NW4NW4, Section 10, Kane County, Utah (see the attached Site Location Map). This land is managed by Utah's School & Institutional Trust Lands Administration. A conceptual drawing of Viresco's proposed project is also attached.

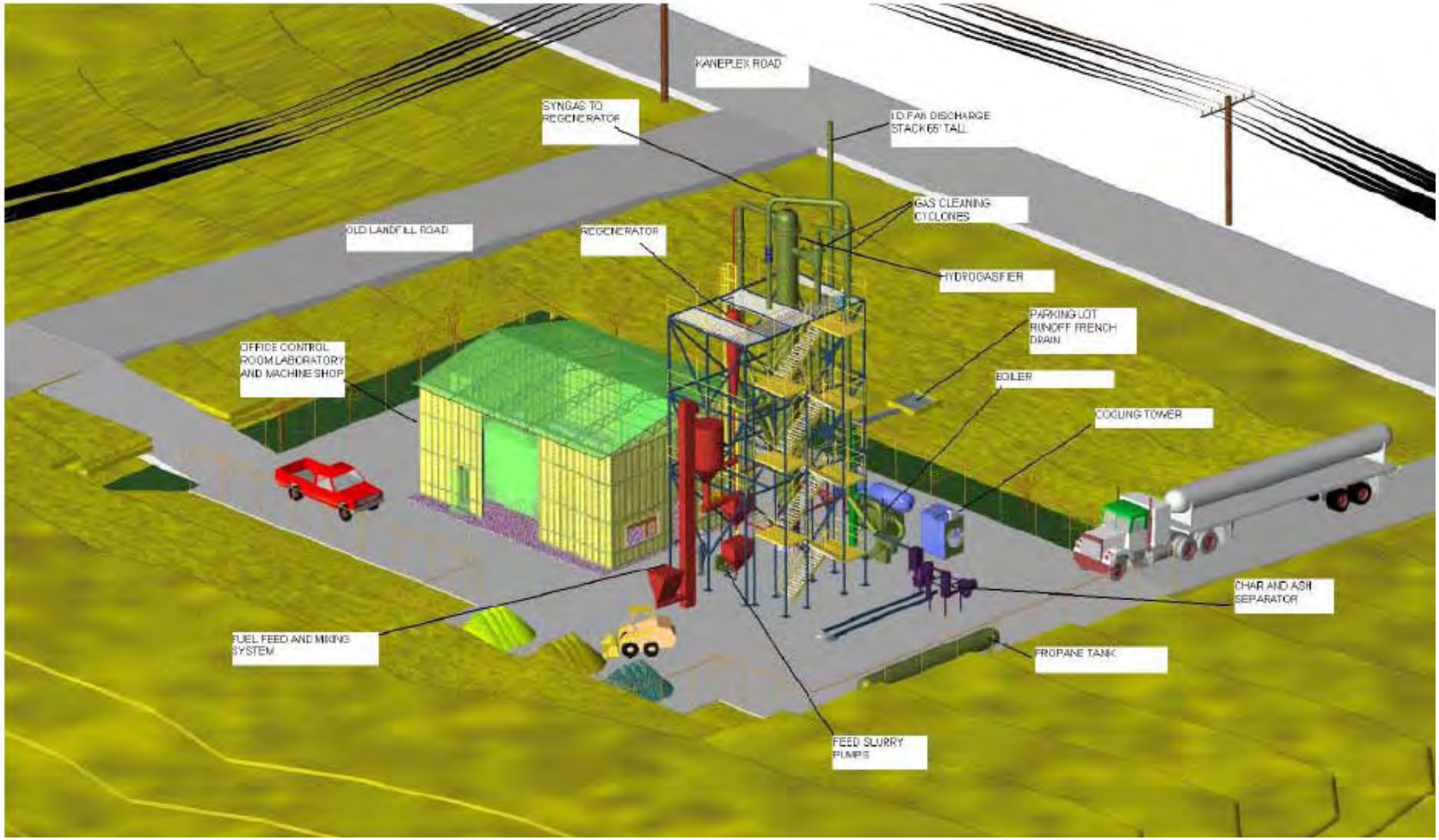
Viresco's project involves the design, construction, and testing of a pilot-scale steam hydrogasification facility to evaluate the enhanced conversion of carbonaceous material in a high-steam environment. During operation the pilot-scale hydrogasification process would convert carbonaceous feedstocks such as coal, and vegetative biomass, into synthesis gas suitable for further processing to liquid fuel or to substitute natural gas. The concept for the pilot plant involves a fluid bed gasifier fluidized by steam and recycled hydrogen with sand as the primary bed material and a heat carrier connected by a standpipe and return line to a fluid bed regenerator (combustor) that heats the sand using char carbon and air. The pilot-scale gasifier to be constructed and operated in this project would have a feedstock throughput of up to 5 tons-per-day when operating.

Field site preparation activities contracted by Viresco would include minor excavation on 0.75 acres with a slope of 10 percent, utility trenching and installation of a concrete slab measuring 40 feet by 45 feet. Viresco would then construct a building on the slab. Exterior production structures and machinery would occupy an additional 5,000 square feet. Maximum height of structures would be 67 feet. Stockpiles of sand, coal and biomass material would be stored onsite.






Site Location Map




Conceptual View of Pilot Plant Looking Northwest

**State of Utah**

GARY R. HERBERT
*Governor*

GREG BELL
*Lieutenant Governor*

**Department of Community and Culture**

MICHAEL HANSEN
*Acting Executive Director*

**State History**

WILSON G. MARTIN
*Acting Director*

UT SHPO

May 25, 2011

Joseph Zambelli
NEPA Document Manager
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown WV 26507

RE: Kanab Steam Hydrogasification Pilot Plant

In reply please refer to Case No. 11-0075

Dear Mr. Zambelli:

The Utah State Historic Preservation Office received your report on May 16, 2011. We have not yet received a request for review of this undertaking from a federal agency. Per 800 Regulations, DOE should submit a Section106 request for consultation. As you indicated, SITLA sent the report as part of their responsibility per a Streamlining PA with Trust Lands. Our office acknowledged the submittal on January 25th and no further comment was required, our office finding no objections to the submittal.

This does not constitute formal consultation under §36CFR800.4 or U.A.C. 9-8-404. If you have questions, please contact me at 801-533-3555 or Jim Dykmann at 801-533-3523.

Sincerely,

Lori Hunsaker
Deputy State Historic Preservation Officer
Archaeology

UTAH STATE HISTORY

UTAH STATE HISTORICAL SOCIETY
ANTIQUITIES
HISTORIC PRESERVATION
RESEARCH CENTER & COLLECTIONS

300 S. RIO GRANDE STREET, SALT LAKE CITY, UT 84101-1182 · TELEPHONE 801 533-3500 · FACSIMILE 801 533-3503 · HISTORY.UTAH.GOV

UT SHPO

## Joseph Zambelli - 11-0075

**From:** "Lori Hunsaker" <lhunsaker@utah.gov>
**To:** <joseph.zambelli@netl.doe.gov>
**Date:** 6/8/2011 12:35 PM
**Subject:** 11-0075
**CC:** "Lori Hunsaker" <lhunsaker@utah.gov>

---

Mr. Zambelli,

Apologies for our oversight on the above referenced case. We did not understand that NETL was a Federal Agency.

As per 36CFR800 we concur with your determination of No Historic Properties Effected.

If you have any questions, please do not hesitate to contact me.

Best,

Lori Hunsaker
Deputy State Historic Preservation Officer- Archaeology
Division of State History
300 Rio Grande Street
Salt Lake City, Utah 84101-1182
(801) 533-3555

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# APPENDIX A2

Correspondence with Native American Tribes

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Staff-to-Staff Consultation Letters were sent to the following Native American Tribes on May 6, 2011 (the letter to the Kaibab Paiute Tribal Council is provided as a representative example):

Chemehuevi Indian Tribe of the Chemehuevi Reservation, California
Colorado River Indian Tribe
Fort McDowell Yavapai Tribe
Fort Mojave Indian Tribe
Havasupai Tribe
Hopi Tribe of Arizona
Hualapai Tribe
Kaibab Band of Paiute Indians
Las Vegas Tribe
Moapa Tribe
Navajo Nation
Paiute Indian Tribe of Utah
San Carlos Apache Tribe
San Juan Southern Paiute Tribe of Arizona
White Mountain Apache Tribe
Yavapai-Apache Tribe

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

May 6, 2011

Carmen Bradley, Chairperson
Kaibab Paiute Tribal Council
HC65, Box 2
Tribal Affairs Building
Fredonia, AZ 86022

Dear Ms. Bradley:

The U.S. Department of Energy (DOE) is considering a proposed action to provide financial assistance to Viresco Energy, LLC to support Viresco's construction and operation of a Coal and Biomass Fueled Pilot Plant in Kanab, Utah. The project would be located at: Sec 10, T44S, R6W, Salt Lake base and meridian, SW4NW4NW4, Section 10, Kane County, Utah (see the attached Site Location Map). This land is managed by Utah's School & Institutional Trust Lands Administration. A description and drawing of Viresco's proposed project are attached.

As the lead federal agency, DOE must comply with Sections 106 and 110 of the National Historic Preservation Act (NHPA) for this undertaking, as well as with the National Environmental Policy Act (NEPA) and the Endangered Species Act. Therefore, this letter is intended to initiate consultation with your tribal government under NHPA and NEPA. Based on a review of the currently available information, DOE concluded that the appropriate level of analysis for its proposed action and Viresco's proposed project would be an environmental assessment.

I would like to request any comments from your government regarding the potential significance of, and potential effects to, any traditional cultural properties, cultural landscapes, or archaeological sites that may be affected by the proposed project. DOE will hold a public scoping meeting to obtain the views of tribes, governmental agencies, private organizations, and the public regarding its proposed action and the scope of the environmental assessment. You are cordially invited to attend this meeting:

| | |
|---|---|
| Date: | May 18, 2011 |
| Time: | Open House: 5:00 to 7:00 pm |
| | Formal Presentation: 7:00pm |
| Location: | Kanab Middle School Cafeteria |
| | 690 S. Cowboy Way |

Individuals wishing to present oral comments may either register at the meeting or register in advance by notifying DOE via phone (304.285.4913) or email (Joseph.Zambelli@NETL.DOE.GOV). You may also provide written comments by sending an email or letter to Mr. Joseph Zambelli, NEPA Document Manager, DOE-NETL, M/S:B07, 3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507-0880. The public comment period will end June 17, 2011.

I would be pleased to discuss the project and the environmental assessment with you. Please do not hesitate to call or email me if you have further questions. Your participation in this ongoing consultation process will be facilitated if we receive a written response on behalf of your tribe.

Thank you for your participation in this important process.

Sincerely,

Joseph Zambelli
NEPA Document Manager

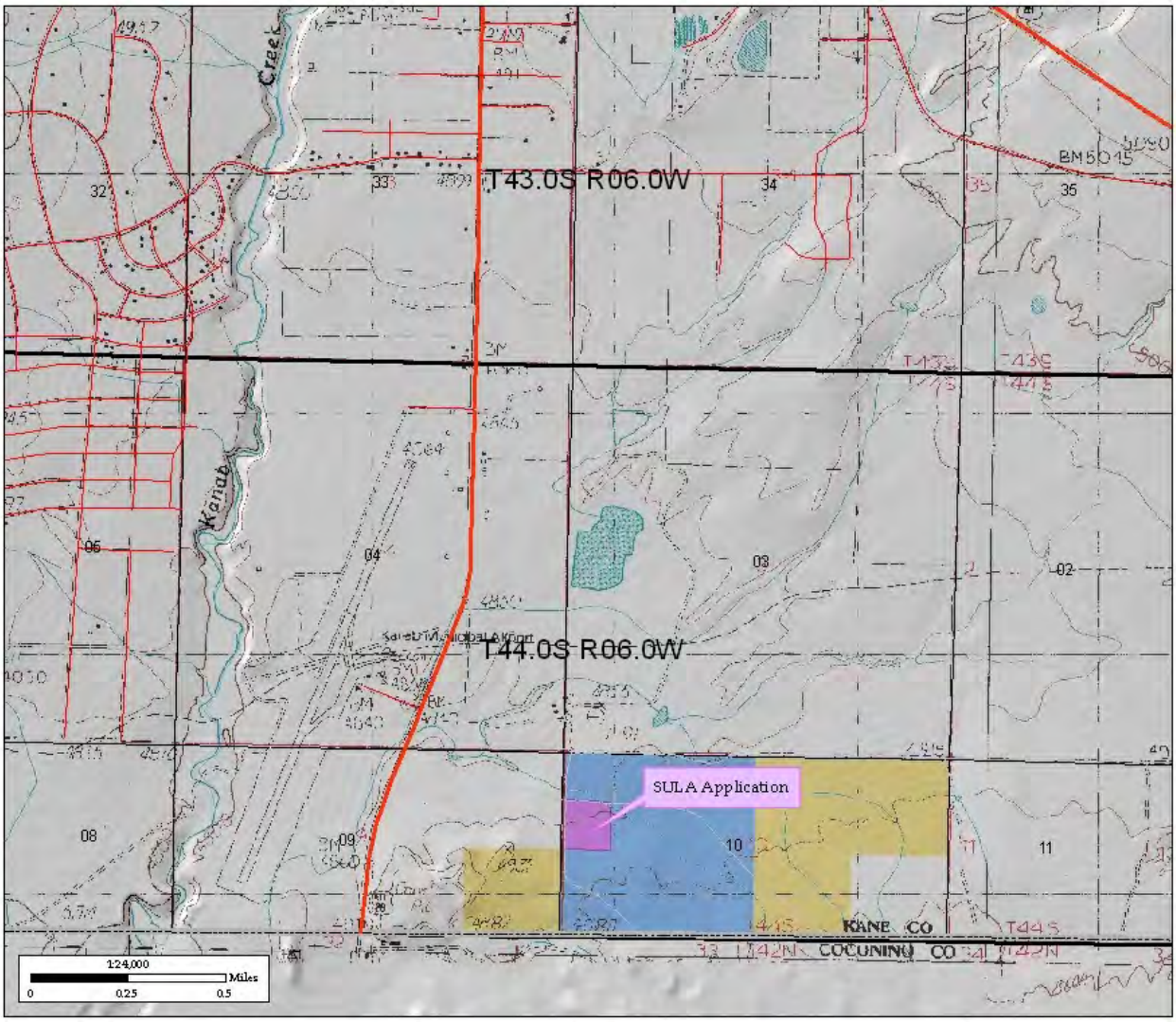
Enclosures

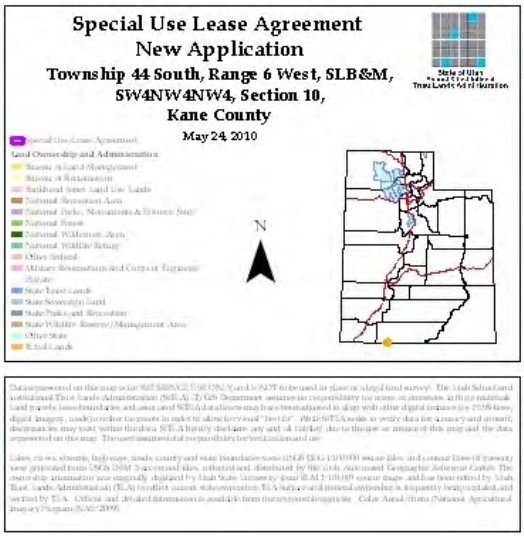
3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
joseph.zambelli@netl.doe.gov • Voice (304) 285-4913 • Fax (304) 285-4403 • www.netl.doe.gov

ATTACHMENT -- Project Description:

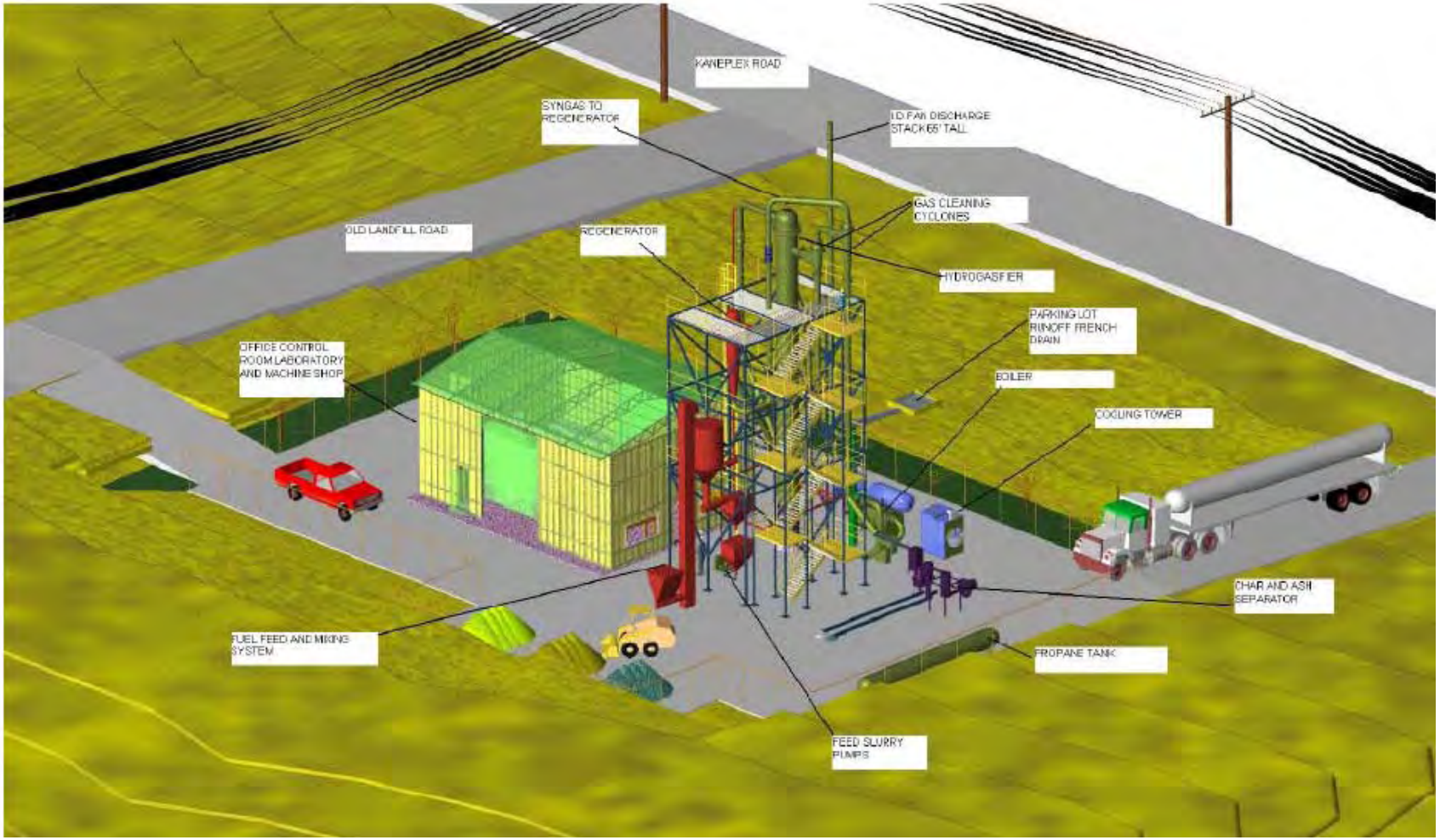
Viresco's project involves the design, construction, and testing of a pilot-scale steam hydrogasification facility to evaluate the enhanced conversion of carbonaceous material in a high-steam environment. During operation the pilot-scale hydrogasification process would convert carbonaceous feedstocks such as coal, and vegetative biomass, into synthesis gas suitable for further processing to liquid fuel or to substitute natural gas. The concept for the pilot plant involves a fluid bed gasifier fluidized by steam and recycled hydrogen with sand as the primary bed material and a heat carrier connected by a standpipe and return line to a fluid bed regenerator (combustor) that heats the sand using char carbon and air. The pilot-scale gasifier to be constructed and operated in this project would have a feedstock throughput of up to 5 tons-per-day when operating.

Field site preparation activities contracted by Viresco would include minor excavation on 0.75 acres with a slope of 10 percent, utility trenching and installation of a concrete slab measuring 40 feet by 45 feet. Viresco would then construct a building on the slab. Exterior production structures and machinery would occupy on an additional 5,000 square feet. Maximum height of structures would be 67 feet. Stockpiles of sand, coal and biomass material would be stored onsite.






Site Location Map




Conceptual View of Pilot Plant Looking Northwest

THE HOPI TRIBE

**LeRoy N. Shingoitewa**
CHAIRMAN

**Herman G. Honanie**
VICE-CHAIRMAN

May 16, 2011

Joseph Zambelli, NEPA Document Manager, DOE-NETL, M/S:B07
Department of Energy, National Energy Technology Laboratory
3610 Collis Ferry Road, P.O. Box 880
Morgantown, West Virginia 26507

Dear Mr. Zambelli,

This letter is in response to your correspondence dated May 6, 2011, regarding the Department of Energy proposing to provide federal financial assistance to Viresco Energy, LLC for construction and operation of a coal and biomass fueled pilot plant in Kanab. The Hopi Tribe claims cultural affiliation to prehistoric cultural groups in Utah. The Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites, and we consider the prehistoric archaeological sites of our ancestors to be "footprints" and Traditional Cultural Properties. Therefore, we appreciate your solicitation of our input and your efforts to address our concerns.

And therefore, the Hopi Cultural Preservation Office is interested in consulting on any proposal in Utah that has the potential to adversely affect prehistoric sites. Because this is a federally funded project that involves ground disturbing activities, to assist us in determining if this proposal may affect cultural resources significant to the Hopi Tribe, please provide us with a copy of the cultural resources survey report of the area of potential effect for review and comment.

In addition, if prehistoric cultural resources are identified that will be adversely affected by project activities, we will request ongoing consulting on any proposed treatment plans. For your information and future correspondences, LeRoy N. Shingoitewa is now Chairman of the Hopi Tribe. If you have any questions or need additional information, please contact Terry Morgart at 928-734-3619 or tmorgart@hopi.nsn. Thank you for your consideration.

Respectfully,

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

xc: Utah State Historic Preservation Office

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

May 25, 2011

Leigh J. Kuwanwisiwma
Director
Hopi Cultural Preservation Office
The Hopi Tribe
P. O. Box 123
Kykotsmovi, AZ 86039

RE: Proposal for providing financial assistance to Viresco Energy, LLC for its proposed coal and biomass fueled project in Kanab, Utah.

Dear Mr. Kuwanwisiwma,

Thank you for your reply regarding the U.S. Department of Energy's proposal to provide financial assistance to Viresco Energy, LLC for its proposed coal and biomass fueled project in Kanab, Utah. Per your request, please find attached a copy of the Bighorn Archaeological Consultants, LLC cultural resource inventory report for the proposed site.

If you have any questions on this or any other item related to the proposed project, please do not hesitate to let me know via phone at 304.285.4913 or by email at joseph.zambelli@netl.doe.gov.

Sincerely,

Joseph Zambelli
NEPA Document Manager

Attachment

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
joseph.zambelli@netl.doe.gov • Voice (304) 285-4913 • Fax (304) 285-4403 • www.netl.doe.gov

THE HOPI TRIBE

**LeRoy N. Shingoitewa**
CHAIRMAN

**Herman G. Honanie**
VICE-CHAIRMAN

June 6, 2011

Joseph Zambelli, NEPA Document Manager, DOE-NETL, M/S:B07
Department of Energy, National Energy Technology Laboratory
3610 Collis Ferry Road, P.O. Box 880
Morgantown, West Virginia 26507

Dear Mr. Zambelli,

Thank you for your correspondence dated May 25, 2011, with an enclosed cultural resources survey report, in response to our May 16, 2011 letter regarding the Department of Energy proposing to provide federal financial assistance to Viresco Energy, LLC for construction and operation of a coal and biomass fueled pilot plant in Kanab on State of Utah, School and Institutional Trust Lands. The Hopi Tribe claims cultural affiliation to prehistoric cultural groups in Utah. The Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites, and we consider the prehistoric archaeological sites of our ancestors to be "footprints" and Traditional Cultural Properties. Therefore, we appreciate your continuing solicitation of our input and your efforts to address our concerns.

As we stated in our May 16, 2011 letter, the Hopi Cultural Preservation Office is interested in consulting on any proposal in Utah that has the potential to adversely affect prehistoric sites. We are aware of numerous prehistoric sites in the Kanab and Jackson Flat area.

We have now reviewed the enclosed cultural resources survey report of the 10 acre area of potential effect that identifies a site described as an open lithic scatter, which is recommended as ineligible for listing on the National Register. Therefore, we have determined that this proposal is unlikely to affect cultural resources significant to the Hopi Tribe.

However, we concur with the recommendation that if any cultural features or deposits are encountered during project activities, the State Historic Preservation Office must be consulted to evaluate their nature and significance. If any Native American human remains or funerary objects are discovered during construction they shall be immediately reported as required by law. If you have any questions or need additional information, please contact Terry Morgart at 928-734-3619 or tmorgart@hopi.nsn. Thank you for your consideration.

Respectfully,

Stewart B. Koyiyumptewa for

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

xc: Utah State Historic Preservation Office

# THE NAVAJO NATION

**BEN SHELLY**
**PRESIDENT**

**REX LEE JIM**
**VICE-PRESIDENT**

July 5, 2010

Joseph Zambelli
NEPA Document Manager
National Energy Technology Laboratory
3610 Collins Ferry Road
PO Box 880
Morgantown, WV 26507

Dear Mr. Zambelli:

Our apology for an oversight and missing the deadline date of your request, and that the Navajo Nation Historic Preservation Department – Traditional Culture Program (NNHPD-TCP) is in receipt of the proposed project where Viresco Energy, LLC is proposing to construct and operate a Coal and Biomass Fueled Pilot Plant in Kanab, Utah.

After reviewing your consultation documents, NNHPD-TCP has concluded the proposed undertaking/project area **will not impact** Navajo traditional cultural resources. The NNHPD-TCP, on behalf of the Navajo Nation has no concerns at this time.

However, the determination made by the NNHPD-TCP does not necessarily mean that the Navajo Nation has no interest or concerns with the proposed project. If the proposed project inadvertently discovers habitation sites, plant gathering areas, human remains and objects of cultural patrimony the NNHPD-TCP request that we be notified respectively in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA).

The NNHPD-TCP appreciates your consultation efforts, pursuant to 36 CFR Pt. 800.1 (c)(2)(iii). Should you have any additional concerns and/or questions, do not hesitate to contact me electronically at tony@navajohistoricpreservation.org or telephone at 928-871-7750.

Sincerely,

Tony H. Joe, Jr., Supervisory Anthropologist *(Section 106 Consultations)*
Historic Preservation Department – Traditional Culture Program

TCP 11-241
CC: Office File/Chrono

**Please consider the environment before printing this e-mail.**

**From:** Joseph Zambelli [mailto:Joseph.Zambelli@NETL.DOE.GOV]
**Sent:** Tuesday, February 01, 2011 12:00 PM
**To:** Leann
**Cc:** Elaine Everitt; John Ganz; Joseph Zambelli
**Subject:** RE: Viresco Energy

Hi LeAnn,

Thanks for your questions. DOE's NEPA regulations and policies can be found at http://nepa.energy.gov/requirements.htm. DOE consults with recognized tribes during its NEPA process. It requests that tribes provide information on properties of traditional religious and cultural significance in the vicinity of the proposed project, and on concerns they have about the project. We use this information to prepare our NEPA reviews and to meet our obligations under Section 106 of the National Historic Preservation Act and the Native American Graves Protection and Repatriation Act of 1990.

Any comments or concerns are included in the draft NEPA document, which is made available for public comment. All entities with which DOE has consulted, as well as any other agencies, groups or persons that may have an interest in the project, receive a copy of the draft document, which is also provided to local public libraries and posted on the following DOE web site: http://www.netl.doe.gov/publications/others/nepa/index.html

DOE has not decided the level of NEPA review that will be required for this grant, but it is likely that an Environmental Assessment will be necessary.

In the context of a grant of financial assistance, DOE does not release funds to the recipient for activities that could limit the range of reasonable alternatives or have an adverse impact on the environment until the NEPA process is complete and DOE decides whether to provide financial assistance to the recipient's proposed project. Since I do not work with the grant and funding aspects of the project, you may want to contact the project manager, Elaine Everitt, at elaine.everitt@netl.doe.gov, for additional information. Keep in mind that DOE's participation in this project is limited to deciding whether to provide financial assistance. It would not be involved in the construction or operation of the facility, although these activities would be analyzed in the NEPA document.

If you have any other questions or need additional information, please let me know.

Thanks

Joe Zambelli

---

NEPA Document Manager

**DOE-NETL**
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880

Phone: 304.285.4913
Email: joseph.zambelli@netl.doe.gov

>>> Leann <kptenv@scinternet.net> 1/31/2011 2:35 PM >>>
Hi Joe;

I haven't worked with DOE before (we usually deal with BLM, USFS, NPS and FERC); can you provide me with a copy of your Tribal consultation and NEPA policies? Plus, can you tell me how the DOE grant process, which apparently Viresco secured, works – in particular, is the grant contingent on the results of the NEPA process?

Thanks!

*LeAnn Skrzynski,*

Environmental Program Director
Kaibab Band of Paiute Indians

**Joseph Zambelli - RE: Viresco Energy**

**From:** Leann <kptenv@scinternet.net>
**To:** Joseph.Zambelli@NETL.DOE.GOV
**Date:** 2/8/2011 4:05 PM
**Subject:** RE: Viresco Energy
**CC:** msavala@kaibabpaiute-nsn.gov; John.Ganz@NETL.DOE.GOV; Elaine.Everitt@NETL.DOE.GOV

Mr. Zambelli, et al;

I appreciate the recognition that we must be consulted with under the NHPA and NAGPRA regarding cultural concerns. However, as a Federal agency DOE also has a Trust responsibility to involve us in this process under a government-to-government relationship above and beyond cultural or religious discussion. I feel as though we are already behind the ball because the project has reached the local Planning & Zoning Commission in Kanab without any notification from DOE to us of the project, and it appears as though any interaction with DOE may never have occurred had I not initiated the process.

To provide a little background about how NEPA, NHPA & NAGPRA have been botched in the very same location to this day as it concerns our Tribe, SITLA-leased lands and Viresco's advocate, Mike Noel, please review last night's Salt Lake news report:

http://www.ksl.com/?nid=148&sid=14297785

I also ask that you read our statement that is listed on the link, as well. Unfortunately, the news channel compounded the issue by identifying the location of the remains (this, in an area renowned for grave desecration for EBay sales) and we are consulting our litigators.

This is the atmosphere in which the Viresco Energy project is taking place and this is why we warned Utah Representative Mr. Noel a month ago that despite his promises to the Tribes on change following Jackson Flat, we could see the Viresco Energy project is following the same trajectory, a train wreck in progress.

Our Tribal Council meets every 3rd Thursday of each month and would benefit from a presentation even at this point in the process, prior to consultation, provided an agenda request has been submitted by the Monday one week preceding the Council. If you can make the March Council date, please make arrangements through our Tribal Secretary, DeeAnn Multine at dmultine@kaibabpaiute-nsn.gov or 928-643-7245.

Thank you,

*LeAnn Skrzynski,*

Environmental Program Director
Kaibab Band of Paiute Indians

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

May 6, 2011

LeAnn Shrzynski, Environmental Program Director
Kaibab Band of Paiute Indians
HC65, Box 2
Fredonia, AZ 86022

Dear Ms. Shrzynski:

The U.S. Department of Energy (DOE) is considering a proposed action to provide financial assistance to Viresco Energy, LLC to support Viresco's construction and operation of a Coal and Biomass Fueled Pilot Plant in Kanab, Utah. The project would be located at: Sec 10, T44S, R6W, Salt Lake base and meridian, SW4NW4NW4, Section 10, Kane County, Utah (see the attached Site Location Map). This land is managed by Utah's School & Institutional Trust Lands Administration. A description and drawing of Viresco's proposed project are attached.

As the lead federal agency, DOE must comply with Sections 106 and 110 of the National Historic Preservation Act (NHPA) for this undertaking, as well as with the National Environmental Policy Act (NEPA) and the Endangered Species Act. Therefore, this letter is intended to initiate consultation with your tribal government under NHPA and NEPA. Based on a review of the currently available information, DOE concluded that the appropriate level of analysis for its proposed action and Viresco's proposed project would be an environmental assessment.

I would like to request any comments from your government regarding the potential significance of, and potential effects to, any traditional cultural properties, cultural landscapes, or archaeological sites that may be affected by the proposed project. DOE will hold a public scoping meeting to obtain the views of tribes, governmental agencies, private organizations, and the public regarding its proposed action and the scope of the environmental assessment. You are cordially invited to attend this meeting:

| | |
|---|---|
| Date: | May 18, 2011 |
| Time: | Open House: 5:00 to 7:00 pm |
| | Formal Presentation: 7:00pm |
| Location: | Kanab Middle School Cafeteria |
| | 690 S. Cowboy Way |

Individuals wishing to present oral comments may either register at the meeting or register in advance by notifying DOE via phone (304.285.4913) or email (Joseph.Zambelli@NETL.DOE.GOV). You may also provide written comments by sending an email or letter to Mr. Joseph Zambelli, NEPA Document Manager, DOE-NETL, M/S:B07, 3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507-0880. The public comment period will end June 17, 2011.

I would be pleased to discuss the project and the environmental assessment with you. Please do not hesitate to call or email me if you have further questions. Your participation in this ongoing consultation process will be facilitated if we receive a written response on behalf of your tribe.

Thank you for your participation in this important process.

Sincerely,

Joseph Zambelli
NEPA Document Manager

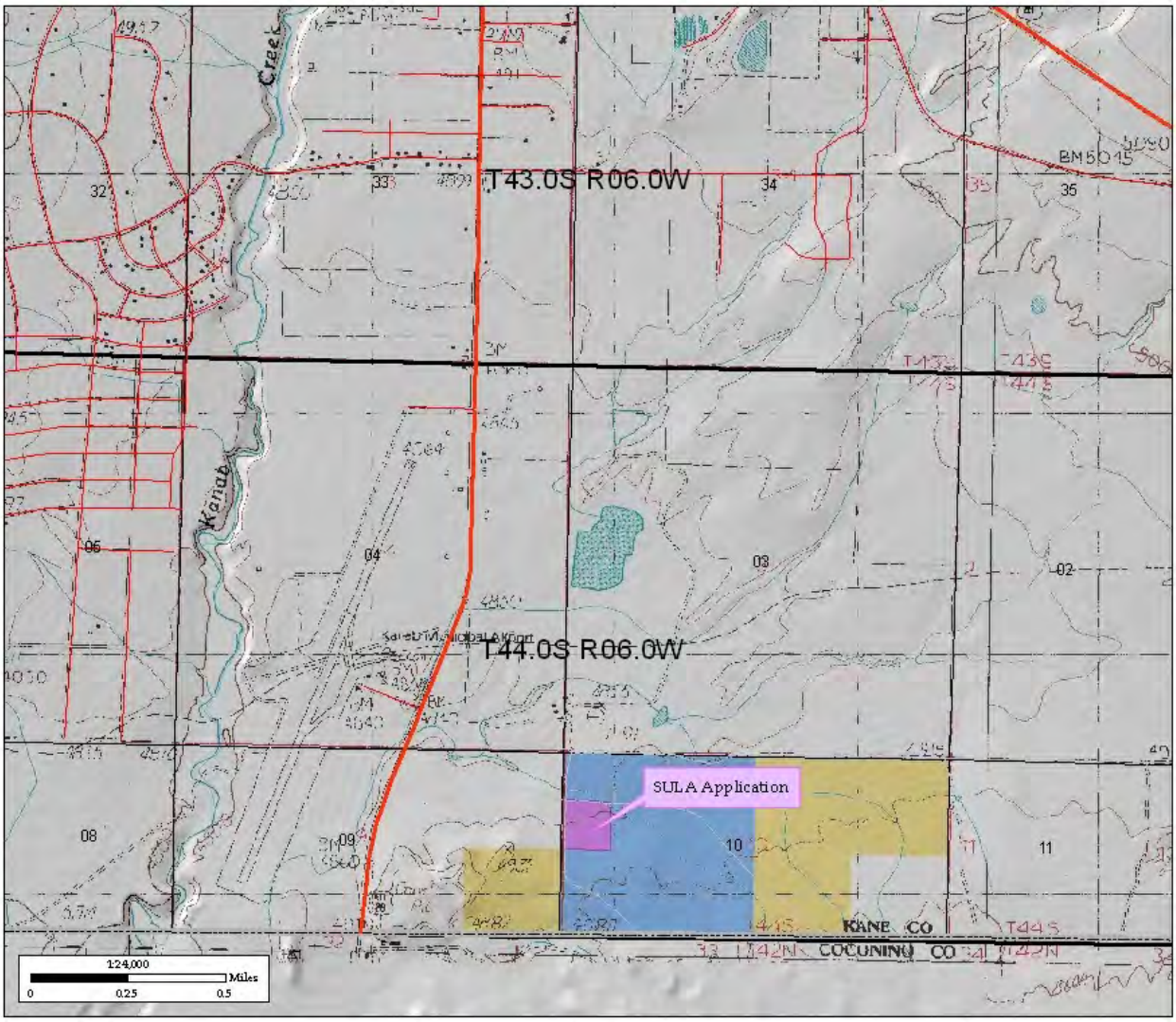
Enclosures

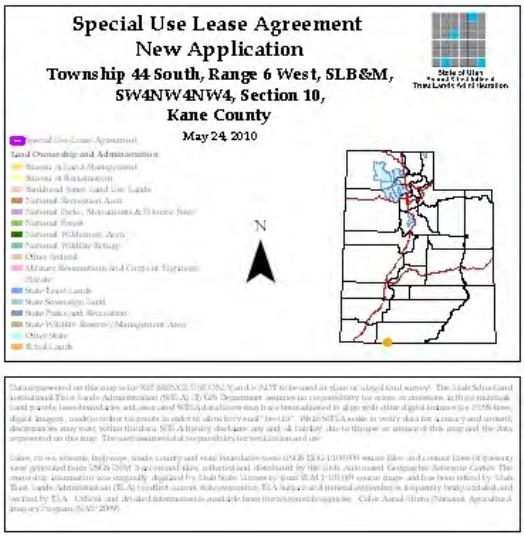
3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
joseph.zambelli@netl.doe.gov • Voice (304) 285-4913 • Fax (304) 285-4403 • www.netl.doe.gov

ATTACHMENT -- Project Description:

Viresco's project involves the design, construction, and testing of a pilot-scale steam hydrogasification facility to evaluate the enhanced conversion of carbonaceous material in a high-steam environment. During operation the pilot-scale hydrogasification process would convert carbonaceous feedstocks such as coal, and vegetative biomass, into synthesis gas suitable for further processing to liquid fuel or to substitute natural gas. The concept for the pilot plant involves a fluid bed gasifier fluidized by steam and recycled hydrogen with sand as the primary bed material and a heat carrier connected by a standpipe and return line to a fluid bed regenerator (combustor) that heats the sand using char carbon and air. The pilot-scale gasifier to be constructed and operated in this project would have a feedstock throughput of up to 5 tons-per-day when operating.

Field site preparation activities contracted by Viresco would include minor excavation on 0.75 acres with a slope of 10 percent, utility trenching and installation of a concrete slab measuring 40 feet by 45 feet. Viresco would then construct a building on the slab. Exterior production structures and machinery would occupy on an additional 5,000 square feet. Maximum height of structures would be 67 feet. Stockpiles of sand, coal and biomass material would be stored onsite.






Site Location Map

NATIONAL ENERGY TECHNOLOGY LABORATORY
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U.S. DEPARTMENT OF ENERGY

May 9, 2011

DeeAnn Multine, Tribal Secretary
Kaibab Band of Paiute Indians
Tribal Affairs Building
HC65, Box 2
Fredonia, AZ 86022

Dear Ms. Multine:

I have written to request that the following agenda item be added for the May 19th, 2011 Tribal Council Meeting to take place in Pipe Springs, Arizona:

- The U.S. Department of Energy (DOE) proposed action to provide financial assistance for construction and operation by Viresco Energy, LLC of a Coal and Biomass Fueled Pilot Plant in Kanab, Utah.

Depending on time available, DOE and Viresco would be pleased to make a brief (10- to 20-minute) presentation about Viresco's proposed project and the environmental assessment being prepared by DOE under the National Environmental Policy Act of 1969.

Attached is a brief project description, site location map, and conceptual drawing of Viresco's proposed project. Should you have any questions or feel additional materials for the meeting would be needed please do not hesitate to contact me via phone (304.285.4913), email (Joseph.Zambelli@NETL.DOE.GOV), or in writing by sending a letter to Mr. Joseph Zambelli, NEPA Document Manager, DOE-NETL, M/S:B07, 3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507-0880.

Thank you in advance for the opportunity of DOE to meet with the Kaibab Band of Paiute Indians on this subject.

Sincerely,

Joseph Zambelli

Joseph Zambelli, NEPA Document Manager

Cc: Manuel Savala, Tribal Chairman
msavala@kaibabpaiute-nsn.gov

Enclosures

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
joseph.zambelli@netl.doe.gov • Voice (304) 285-4913 • Fax (304) 285-4403 • www.netl.doe.gov

ATTACHMENT -- Project Description:

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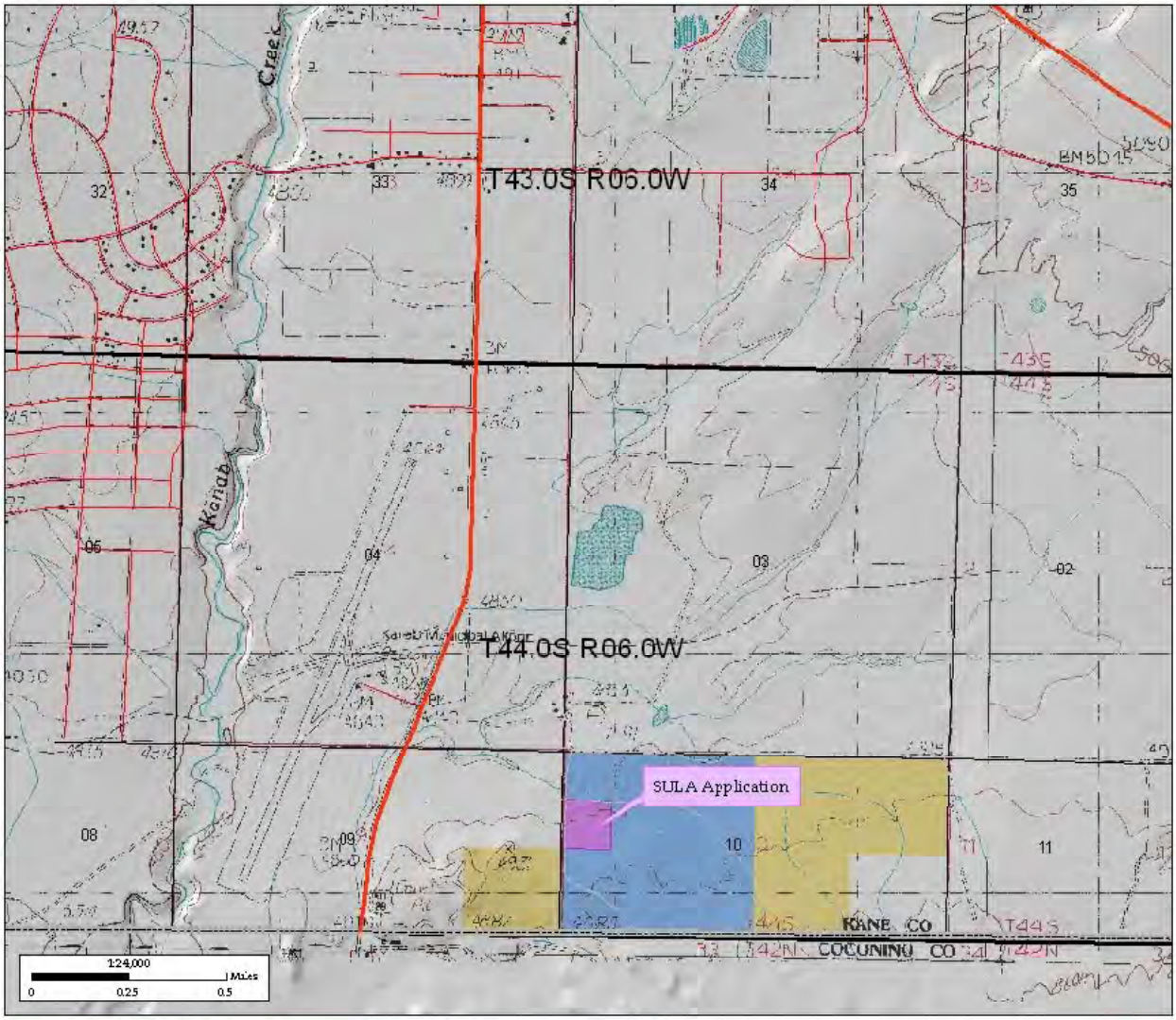
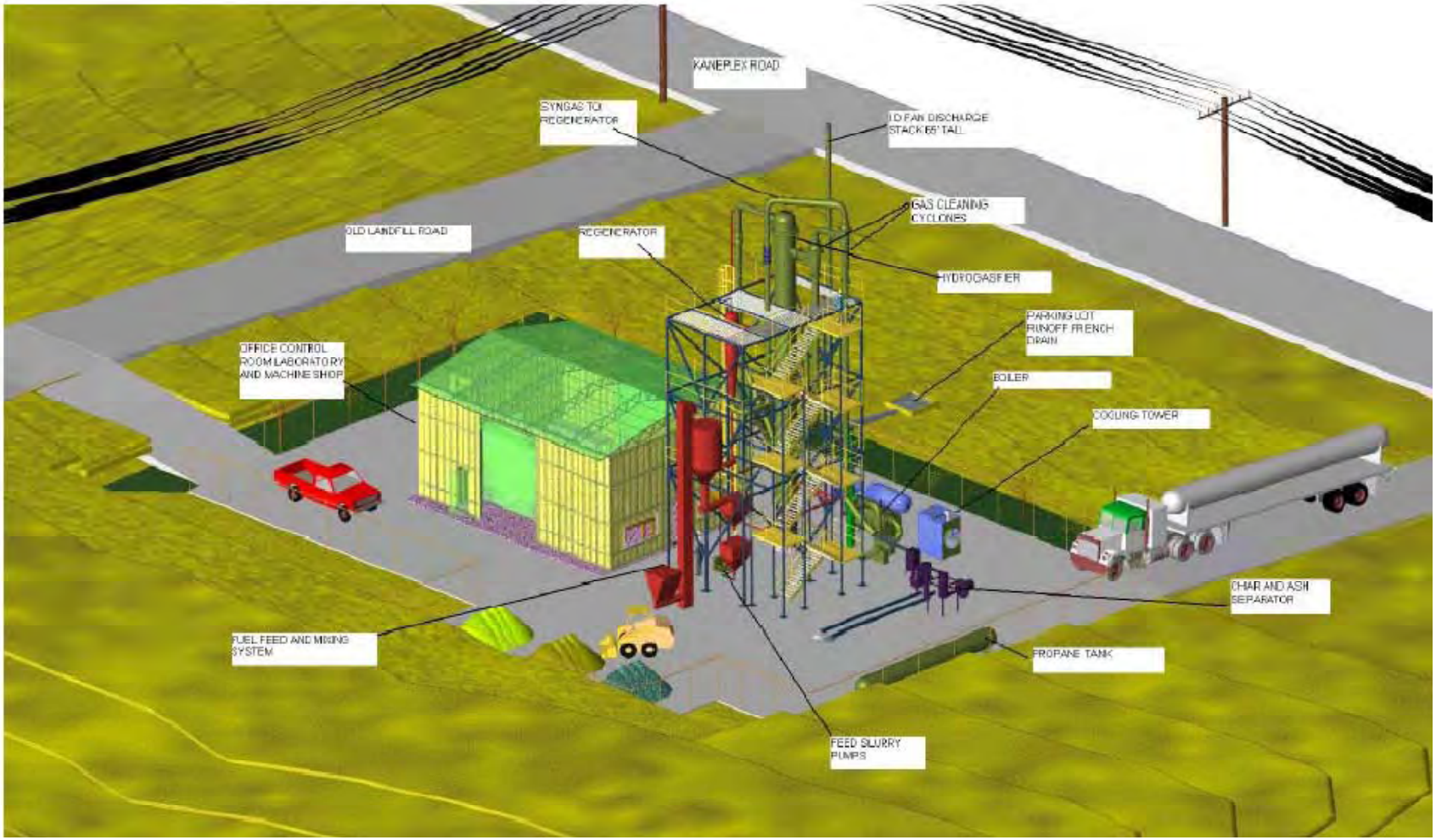


Site Location Map




Conceptual View of Pilot Plant Looking Northwest

June 13, 2011

Mr. Anthony Cugini
Director
US DOE – National Energy Technology Laboratory

Mr. Joseph Zambelli
NEPA Document Manager
US DOE – National Energy Technology Laboratory
3610 Collins Ferry Road
PO Box 880
Morgantown, WV 26507-0880

Submitted via email to: joseph.zambelli@NETL.DOE.GOV , Albert.petrasek@hq.doe.gov , and Anthony.Cugini@NETL.DOE.GOV

Re : **Utah Coal and Biomass Fueled Pilot Plant EA**

Dear Mr. Cugini and Zambelli;

We are writing to you regarding our first round of scoping comments plus our concerns on the way recent meetings were conducted for the Viresco Energy's Coal & Biomass-fueled pilot plant environmental analysis which is being proposed for Kanab, Utah .

As you are well aware, our Tribe has been anxious about this project since word of it appeared in the Salt Lake Tribune last fall. Our Reservation is about a mile from the site and our citizens often live in Kanab. As we were in the midst of unresolved issues resulting from an adjacent project, the Jackson Flat Reservoir, we knew that this project was one to watch and have tracked it closely.

We understand that NETL may not be well-acquainted with Tribal considerations but we would like to make the following points:

1. To this day, we have not received contact from any DOE Tribal Liaison. This is a critical oversight which we thought would be given a high priority as it was brought to DOE's attention in the meeting with our Tribal Council on May 19.

2. In addition, at the same meeting we made it clear that our expectation was to engage in a government-to-government exchange with the DOE Technical Manager, Elaine Everitt, rather than the company's proponent. We would like to have an informative discussion with both of these personnel as soon as practicable.

3. As noted, we were not appreciative that the public meeting held in Kanab indicated that consultation with our Tribe was already under way, although only minimal staff-to-

staff discussion by email had occurred. According to the definition of consultation in the DOE Indian policy, this is not recognized as such until agreements have been reached as to what constitutes official consultation. No agreement has been initiated to date.

4. The scoping meeting in Kanab was insufficient, as the visual aids were too vague to be of substance. While scoping meetings are meant to elicit comments for the environmental analysis to consider, asking a community to formulate questions in a vacuum is not good practice and could be considered misleading. For example, the by-products listed were given as hydrogen sulfide, carbon dioxide and slag which clearly was too simplistic for these purposes.

5. At the Kanab meeting and the Tribal meeting, there was virtually no detail of this specific project given and only vague generalities about the coal gasification process were provided. For instance, nothing addressed the potential ramifications of using biomass fuel or identified the actual biomass fuels that Viresco is proposing to use, where they plan to obtain them and how the waste from the process will be handled.

We are well-acquainted with the NEPA process as we work with many Federal agencies on a daily basis, including the Departments of the Interior, Agriculture, Housing and Urban Development, Defense and even DOE (FERC). We understand that all Federal agencies have their own policies which interpret NEPA but we are not being accorded the benefit of DOE's own consultation policy nor the recognition of Tribal sovereignty.

The presentations and materials provided were so cursory as to be meaningless. We ask that DOE return to our Tribal government and community with a well-developed scoping presentation, including the Tribal liaison, the DOE technical expert and a willingness to begin formal consultation.

**Until such time as a new scoping meeting and government consultation can take place and to make sure no mistake is made in making deadlines within the current scoping process, we submit the following comments to be considered:**

By funding this action, DOE is facilitating a project that has direct implications for our Tribe. We ask that a full Environmental Impact Statement be used to best characterize the cumulative effect this project may have on our Tribe and the region.

- Traditional religious practitioners of our Tribe indicate that the project site is a Sacred Site contiguous with the Jackson Flat reservoir area. As such, in addition to the typical assessment of cultural resources, we request that DOE prepare a Social Impact Assessment to include the relationship of our people with that environment and the project's cultural and social effects.

As DOE recognizes Tribal governments as sovereign entities with primary authority and responsibility for the protection of the health, safety and welfare of their citizens plus the right of each Indian nation to protect its natural and cultural resources, we have many concerns above and beyond the cultural ones typically associated with Tribes.

- What is the source and composition of each feedstock ?

- How will each potential feedstock be stored prior to its use and how much fugitive dust will result (from storage plus milling/grinding and any other processing of feedstocks)?

- Will the carbon dioxide produced be released or sequestered, and if plans are to sequester it, where would that occur? We ask that a different location be considered, where carbon dioxide capture and storage could be included in the demonstration.

- The funds that have been earmarked for this experimental process could be better used to increase efficiency or further the development of renewable technology; we would like a comparison of these processes made as an alternative for study in an EIS, particularly as the state of technology indicates the sequestration inherently necessary for coal gasification production to be considered a "clean technology" is not viable

- We ask for a complete analysis of the liquid aspects of this project, including an identification of all water or liquids, where and in what quantity they will be obtained, how it will be used in the process, any changes (chemical, electrical , thermal, etc.) that will occur, how it will be processed or treated and what triggers each of those processes before it is released, all potential releases to the environment, and a plan for remediation of all resulting liquids/water that may enter the water table, municipal water treatment, surface or ground water systems from all potential feedstocks or commingled feedstocks, and how these releases can affect wildlife, air & water quality, riparian ecosystems, and human health.

Note: Human health impacts need to quantify mortality and morbidity plus sub-lethal health threats such as heart and lung disease, bronchitis and asthma, with the limitations of rural health-care, <u>on a population already compromised by the physiological effects of high elevation.</u>

- Identification of all compounds, toxic or hazardous materials, and radioactive elements used for, released and/or generated by the process, and how these can affect wildlife, riparian ecosystems, air & water quality, and human health.
- Please model all impacts (including health and economic) resulting from weather inversions and frequency of plume blight, and how these can affect wildlife, riparian ecosystems, and air & water quality.

- Please perform a Greenhouse Gas emission analysis including all fuels used during initiation of the gasification process and the cumulative transport of feedstocks and wastes.

- A study of odor impacts associated with the processing, and gasification, of each of the feedstocks or commingled feedstocks and how these can affect wildlife, riparian ecosystems, air & water quality, and human health.

- A study of noise impacts associated with the processing, and gasification, of each of the feedstocks or commingled feedstocks and how these can affect wildlife, riparian ecosystems, air & water quality, and human health.

- We request a scenic resource impact analysis that will take into consideration the impacts from exterior lighting, opacity effects from emissions, light pollution in a community intent on Dark Sky qualities, regional haze effects on visibility, windrose assessment to determine wind patterns over a given year, and the height of stacks and other structures in a highly visible area with a tourism-based economy and how these can affect wildlife, riparian ecosystems, air & water quality, and human health.

- Please provide a clear analysis of the triggers for further regulation and the regulatory agencies responsible for oversight on all emissions, residuals or wastes resulting from all potential feedstocks or commingled feedstocks and their effects on the environment.

- DOE should perform a comparison that would evaluate the impacts on this greenfield site as compared to a brownfield site in an urban area

- We request preparation of adequate emergency response plans generated to handle all foreseeable emergencies

- We request that DOE stay the funding decision on this project until a Finding of No Significant Impact or Record of Decision is completed.

In closing, we ask that a full Environmental Impact Statement be used to best characterize the affect this project may have on our Tribe and the region. We wish to express our appreciation for your consideration in reviewing these comments and working with you once consultation is initiated.

Please contact our Tribal Secretary to schedule a scoping meeting with our Tribal Council and a request for consultation.

Regards,

Manuel Sayala

Cc: Albert Brandt Petrasek

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

August 1, 2011

Manuel Savala
Chairman of Tribal Council
Kaibab Band of Paiute Indians
Tribal Affairs Building
HC65, Box 2
Fredonia, AZ 86022

Re: Department of Energy Presentation at Public Scoping Meeting for the Utah Coal and Biomass Fueled Pilot Project on May 18, 2011

Dear Chairman Savala,

I understand that your Tribal Council has objected to statements that Department of Energy (DOE) representatives made to the citizens of Kanab during the May 18th scoping meeting regarding the status of DOE consultations with the Kaibab Band of the Paiute Indians. We regret that these statements implied that DOE had initiated formal government-to-government consultation with your tribe prior to that public meeting. We should have made it clear that only staff-to-staff level contact had occurred. In most cases, our interaction with tribal governments during our National Environmental Policy Act (NEPA) review has occurred at the staff-to-staff level and a formal government-to-government consultation has not been requested. In this case, however, please be assured that we understand the importance of your tribal government's request for formal government-to-government consultation and that we understand that this level of consultation has now been initiated with DOE participation in your tribal council meeting held on July 21, 2011.

We will ensure that DOE representatives correct any misunderstandings and present an accurate status of DOE's consultation efforts during the public meeting on the Draft Environmental Assessment for the Utah Coal and Biomass Fueled Pilot Project currently being planned for later this year.

Sincerely,

Richard A. Hargis, Jr.
Director
Environmental Compliance Division

e-mail cc: D. Conrad, DOE/HQ; E. Everitt, NETL; J. Zambelli, NETL

626 Cochrans Mill Road, P.O. Box 10940, Pittsburgh, PA 15236
hargis@netl.doe.gov@netl.doe.gov • Voice (412) 386-6065 • Fax (412) 386-4778 • www.netl.doe.gov

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# APPENDIX B

Plants and Animals of Cultural Concern to the
Kaibab Band of Paiute Indians of Northern Arizona

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**Paiute Plants**

| Tribal Name | Scientific Name | Common Name |
|---|---|---|
| NR | Abutilon incanum | Indian mallow |
| Uaahu | Acacia greggii | Catclaw acacia |
| Kaiva uusiv | Agave utahensis var. kaibabensis | Kaibab agave |
| Yaant | Agave utahensis var. utahensis | Utah agave |
| Ketsiav, Tempisangwavi, Tumpisangwav | Ambrosia dumsoa | White bursage |
| Sangwav | Artemisia bigelovii | Bigelow sagebrush |
| Chumav | Artemisia filifolia | Sand sagebursh |
| NR | Astragalus praelongus | Rattleweed, locoweed |
| NR | Astragalus tephrodes | |
| Sikumpe, tono | Atriplex canescens | Four-wing saltbrush |
| Kanave, Koauw kanav | Baccharis salicifolia | Seepwillow |
| Unapi, Unapyi op | Battarea stevinii | Mushroom |
| Mausi | Cercis occidentalis var. orbiculata | California redbud |
| | Chilopsis linearis | Desert willow |
| Sikumpe | Chrysothamnus nauseus | Rubber rabbitbursh |
| Manavip | Cirsium sp. | Pink thistle |
| | Clematis ligusticifolia | Western virgin's bower, Wild clematis |
| Momop, mainowip, momonp | Datura meteloides (=D. wrightii) | Sacred datura, jimsonweed |
| Aku'u, ku'u | Descurainia pinnata | Yellow tansy mustard |
| Sakwapi | Dyssodia pentachaeta (D. thurberi) | Fetid marigold |
| Manav | Echinocereus engelmannii | Engelman hedgehog cactus |
| Chuamanav, i'mamanavi | Echinocereus triglochidiatus | Claretcup cactus |
| Sana'ich, Tuwich | Encelia farinosa | White brittlebush |
| Sana'ich, tuwich | Encelia frutescens var. resinosa | Brittlebush |
| Tup | Ephedra nevadensis | Nevada Indian tea |
| Yatup, tutup | Ephedra torreyana | Torrey Indian tea |
| | Ephedra viridis | Indian tea |
| Paxwav, Sakwa'ivi, Sakwa'ivip | Equisetum laevigatum | Smooth scouring rush |
| Muup | Fallugia paradoxa | Apache plume |
| Tase, Tash, Manav Avatu tash | Ferocactus acanthodes | California barrel cactus |
| Tuav | Franxinus pennsylvanica | Velvet ash |
| Yainup, waarump | Gutierrezia microcephala | Three-leaf snakeweed, Matchweed |
| Pauv | Juncus acutus var. sphaerocarpus | Spiny rush |
| Yatump | Larrea tridentata | Creosote bush, Greasewood |
| Pa'up, Pa'uv, U'up | Lycium andersonii | Wolfberry |
| U'up | Lycium fremontii | Fremont wolfberry |
| Paakwanav | Mentha arvensis | Field mint |
| Tukwivi, tuwkvi, toxo'owatsiv | Miravilis multiflora | Colorado four-o'clock |
| Wichavi ma'ap | Muhlenbergia asperifolia | Scratch grass |
| Pamav, paenaxenanar | Nasturtium officinale | Watercress |
| Ko'api, Nengweko'ap | Nicotiana trigonophylla | Desert tobacco |
| Ata wiisiv | Nolina microcarpa | Beargrass |
| Sixo' | Oenothera pallida | Pale evening primrose |
| Manav | Opuntia basilaris | Beavertail cactus |
| Yuavip | Opuntia erinacea | Grizzlybear cactus |
| Manav | Opuntia phaeacantha | Engelmann prickly pear |

| Tribal Name | Scientific Name | Common Name |
|---|---|---|
| Wa'iv | Oryzopsis hymenoides | Indian ricegrass |
| Patowanamauv | Parthenocissus vitacea | Virginia creeper |
| Pajama | Phragmites australis | Giant common reed |
| Soovip | Populus fremontii | Fremont cottonwood |
| Opimp, opimpe | Prosopis glandulosa var. torreyana | Torrey mesquite |
| Suuv | Rhus trilobata var. simplicifoia | Squaw bush |
| Su'uv, Shuuvi | Rhus trilobata var, trilobata | Squaw bush |
| Ku'u, nampitu | Rumex hymenosepalus | Wild rhubarb |
| Kanav | Salix exigua | Coyote willow |
| Paakanav | Salix gooddingii | Goodding willow |
| Manavip, manav | Salsola iberica | Russian thistle, thumbleweed |
| Nengweko'ap | Salvia davidsonii | Davidson sage |
| Kanareko'ap | Salvia dorrii | Purple sage, desert sage |
| Manav | Sclerocactus parviflorus | Pineapple cactus, Devil's claw |
| Mamuiv | Sonchus oleraceus | Common sow-thistle |
| Kupinav, Tupwiv | Sphaeralcea ambigua | Desert globemallow |
| Temar, Chemar | Stanleya pinnata | Prince's plume, Indian spinach |
| Tuwisanakup | Stephanomeria tenuifolia | Wire lettuce |
| Pa'ante maav | Tamarix chinensis | Tamarisk, salt cedar |
| NR | Tessaria sericea | Arrowweed |
| Kaiva sixwana | Thamnosma montana | Turpentine broom |
| Pa'ante sawap, pantusahwav,to'ovi,tonov | Typha latifolia | Broad-leaf cattail |
| Iyaavi, pukwupe, kuripsup, we'ump | Vitis arizonica | Canyon grape |
| Uusiv, wiisiv | Yucca angustissima | Narrowleaf yucca |
| Tachempi, Uusiv, Wiisiv | Yucca baccata | Banana yucca |
| NR | Yucca whipplei | Whipple yucca |

July 3, 2008

Animals of Cultural Concern to the Kaibab Band of Paiute Indians of Northern Arizona, this list is not in any kind of order.

Mule Deer
Rabbits, incl. cottontails
Most small birds
Chipmunks
Coyotes
Fox
Badgers
Squirrels (Flying and Non Flying)
Eagles
Mice/Rats
Porcupine
Bats
Crows/Ravens
All Snakes (i.e. Rattle, Blow)
Condors
Skunks
Raccoons
Lizards
Gophers
owls
Mourning Doves
Crickets
Grasshoppers
Bighorn sheep
Buffalo
Woodpeckers
Antelope
Bobcats/Lynx
Mountain Lions
Ducks
All Hawks
Prairie Dogs
Fish
Frogs

Danny Bulletts, Jr.
Director of Fisheries, Wildlife & Parks
Kaibab Band of Paiute Indians
HC 65 Box 2
Fredonia, Arizona 86022

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# APPENDIX C

Will-Serve Letters from Utility Suppliers

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Mayor
Nina Laycook
City Manager
Duane Huffman
Treasurer
RaeLene Johnson
City Attorney
Van Mackelprang

KANAB
UTAH

City Council
James G. Sorenson
Shaun Smith
Ed Meyer
Steven R. Mower
Anthony Chatterley

October 13, 2010

Subject: Can & will Serve Letter – 400 East Kaneplex Road (Viresco Energy Project)

To whom it may concern:

This Letter confirms that Kanab City can and will furnish water and sewer service to the above project contingent upon the placement of necessary infrastructure.

Please contact me with any questions.

Sincerely,

Duane Huffman
City Manager

– A Western Classic –

76 North Main No. 14 ▿ Kanab, Utah 84741 ▿ Phone 435-644-2534 ▿ Fax 435-644-2536 ▿ www.kanab.utah.gov

Garkane Energy Cooperative, INC.
Po Box 511
Hatch Ut. 84735

**Garkane Energy**

# Will Serve Letter

**To:** Viresco Energy LLC.

**Attn:** Jim Guthrie/Arun Raju

**From:** Rob Wolfley, Garkane Propane.

**Date:** 6/15/11

**Re:** Kanab Pilot Plant will serve letter.

---

Gentlemen,

Per your request we are pleased to provide you with a will serve letter in support of your proposed Kanab pilot plant operation.

Garkane Propane has a bulk facility located in Kanab and can store approximately 30,000 gallons of LP gas. We have the ability to supply you with all your propane requirements. We currently serve many local customers in the Kanab area and are please to offer our service you.

We appreciate the opportunity to serve your LP gas Needs.

Rob Wolfley

Garfield Area Manager.

435-735-4280

rwolfley@garkaneenergy.com

August 8, 2011

Arun SK Raju, Ph.D.,
Director of Research,
Viresco Energy, LLC,
1401 Research Park Dr., Suite 400,
Riverside,CA - 92507
E-mail: arun.raju@virescoenergy.com

To Whom It May Concern:

With some improvements made to the electrical system, Garkane Energy has the means to provide 225kW of power for the electrical service needs for the "Synthetic Fuel Coal Gasification Research and Development Facility " project, located in the Kane Plex Industrial Center, 400 E. Kane Plex Drive. The electrical service is contingent on easements, necessary system improvements and a 3-phase 12.5kV power line constructed and ran to the site.

Should you have any questions, please let us know.

Sincerely,

GARKANE ENERGY

Jeff Vaughn
Kanab Area Manager

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# APPENDIX D

Air Quality Documentation

Air Emissions Calculations (D1), Small Source Exemption Registration (D2)

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# APPENDIX D1

Air Emissions Calculations

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## D.1 Air Emissions Calculations

**Table D-1 Construction Equipment Use**

| Equipment type | Number of units | Days on site | Hours per day | Operating hours |
|---|---|---|---|---|
| Graders Composite | 1 | 60 | 7 | 420 |
| Excavators Composite | 1 | 60 | 7 | 420 |
| Rubber Tired Dozers Composite | 2 | 60 | 7 | 840 |
| Off-Highway Trucks Composite | 2 | 60 | 7 | 840 |
| Air Compressors | 1 | 90 | 7 | 630 |
| Cement & Mortar Mixers | 1 | 90 | 7 | 630 |
| Cranes | 1 | 60 | 7 | 420 |
| Generator Sets | 1 | 120 | 7 | 840 |
| Tractors/Loaders/Backhoes | 3 | 120 | 7 | 2520 |

**Table D-2 Construction Equipment Emission Factors (lbs/hour)**

| Equipment | CO | $NO_x$ | VOC | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| Graders Composite | 0.6561 | 1.6191 | 0.1936 | 0.0015 | 0.0840 | 0.0840 |
| Excavators Composite | 0.5828 | 1.3249 | 0.1695 | 0.0013 | 0.0727 | 0.0727 |
| Rubber Tired Dozers Composite | 1.5961 | 3.2672 | 0.3644 | 0.0025 | 0.1409 | 0.1409 |
| Off-Highway Trucks Composite | 0.8499 | 2.7256 | 0.2730 | 0.0027 | 0.0989 | 0.0989 |
| Air Compressors | 0.3782 | 0.7980 | 0.1232 | 0.0007 | 0.0563 | 0.0563 |
| Cement and Mortar Mixers | 0.0447 | 0.0658 | 0.0113 | 0.0001 | 0.0044 | 0.0044 |
| Cranes | 0.6011 | 1.6100 | 0.1778 | 0.0014 | 0.0715 | 0.0715 |
| Generator Sets | 0.3461 | 0.6980 | 0.1075 | 0.0007 | 0.0430 | 0.0430 |
| Tractors/Loaders/Backhoes | 0.4063 | 0.7746 | 0.1204 | 0.0008 | 0.0599 | 0.0599 |

Source: CARB, 2007.

**Table D-3 Construction Equipment Emissions (tpy)**

| Equipment | CO | $NO_x$ | VOC | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| Graders Composite | 0.1378 | 0.3400 | 0.0406 | 0.0003 | 0.0176 | 0.0176 |
| Excavators Composite | 0.1224 | 0.2782 | 0.0356 | 0.0003 | 0.0153 | 0.0153 |
| Rubber Tired Dozers Composite | 0.6703 | 1.3722 | 0.1530 | 0.0010 | 0.0592 | 0.0592 |
| Off-Highway Trucks Composite | 0.3569 | 1.1448 | 0.1146 | 0.0011 | 0.0415 | 0.0415 |
| Air Compressors | 0.1191 | 0.2514 | 0.0388 | 0.0002 | 0.0177 | 0.0177 |
| Cranes | 0.1262 | 0.3381 | 0.0373 | 0.0003 | 0.0150 | 0.0150 |
| Generator Sets | 0.1454 | 0.2932 | 0.0451 | 0.0003 | 0.0181 | 0.0181 |
| Tractors/Loaders/Backhoes | 0.5120 | 0.9759 | 0.1517 | 0.0010 | 0.0754 | 0.0754 |
| Total Equipment Emissions | 2.1902 | 4.9938 | 0.6169 | 0.0045 | 0.2599 | 0.2599 |

**Table D-4 Delivery of Equipment and Supplies**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Number of Deliveries** | 2 | | | | | | |
| **Number of Trips** | 2 | | | | | | |
| **Miles Per Trip** | 60 | | | | | | |
| **Days of Construction** | 120 | | | | | | |
| **Total Miles** | 28800 | | | | | | |
| **Pollutant** | **CO** | **$NO_x$** | **VOC** | **$SO_x$** | **$PM_{10}$** | **$PM_{2.5}$** | **$CO_2$** |
| **Emission Factor (lbs/mile)** | 0.0219 | 0.0237 | 0.0030 | 0.0000 | 0.0009 | 0.0007 | 0.0219 |
| **Total Emissions (lbs)** | 632.14 | 682.92 | 86.19 | 0.74 | 24.65 | 21.29 | 632.14 |
| **Total Emissions (tpy)** | 0.3161 | 0.3415 | 0.0431 | 0.0004 | 0.0123 | 0.0106 | 0.3161 |

Source: CARB, 2007.

| Table D-5 Surface Disturbance | | | | | | |
|---|---|---|---|---|---|---|
| **TSP Emissions** | 80 | lb/acre | | | | |
| **$PM_{10}$/TSP** | 0.45 | | | | | |
| **$PM_{2.5}$/$PM_{10}$** | 0.15 | | | | | |
| **Period of Disturbance** | 30 | days | | | | |
| **Capture Fraction** | 0.5 | | | | | |
| **Building/CHP Plant** | **Area (acres)** | **TSP (lbs)** | **$PM_{10}$ (lbs)** | **$PM_{10}$ (tons)** | **$PM_{2.5}$ (lbs)** | **$PM_{2.5}$ (tons)** |
| **Construction** | 0.1 | 240 | 108 | 0.05 | 8 | 0.001 |
| **Total** | **0.1** | **240** | **108** | **0.05** | **8** | **0.001** |

Sources: USEPA, 1995 and USEPA, 2005.

| Table D-6 Worker Commutes | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Number of Workers** | 30 | | | | | | |
| **Number of Trips** | 2 | | | | | | |
| **Miles Per Trip** | 40 | | | | | | |
| **Days of Construction** | 120 | | | | | | |
| **Total Miles** | 288000 | | | | | | |
| **Pollutant** | **CO** | **$NO_x$** | **VOC** | **$SO_x$** | **$PM_{10}$** | **$PM_{2.5}$** | **$CO_2$** |
| **Emission Factor (lbs/mile)** | 0.0105 | 0.0011 | 0.0011 | 0.0000 | 0.0001 | 0.0001 | 0.0105 |
| **Total Emissions (lbs)** | 3037.95 | 317.63 | 310.81 | 3.10 | 24.50 | 15.24 | 3037.95 |
| **Total Emissions (tpy)** | 1.5190 | 0.1588 | 0.1554 | 0.0015 | 0.0122 | 0.0076 | 1.5190 |

Source: CARB, 2007.

| Table D-7 Total Construction Emissions (tpy) | | | | | | |
|---|---|---|---|---|---|---|
| **Activity/Source** | **CO** | **$NO_x$** | **VOC** | **$SO_x$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Construction Equipment** | 3.8142 | 8.8763 | 1.0617 | 0.0079 | 0.4396 | 0.4396 |
| **Delivery of Equipment and Supplies** | 0.3161 | 0.3415 | 0.0431 | 0.0004 | 0.0123 | 0.0106 |
| **Worker Commutes** | 1.5190 | 0.1588 | 0.1554 | 0.0015 | 0.0122 | 0.0076 |
| **Total Construction Emissions** | 5.6493 | 9.3765 | 1.2602 | 0.0099 | 0.4642 | 0.4579 |

| Table D-8 Materials Used and Produced | | | | |
|---|---|---|---|---|
| **Inputs** | | | | |
| Coal | 424 | lb/hr dry | 192.32 | kg/hr |
| Water | 1083 | lb/hr | 491.24 | kg/hr |
| Natural gas | 153 | lb/hr | 69.40 | kg/hr |
| Sand | 1 | lb/hr | 0.45 | kg/hr |
| **Outputs** | | | | |
| Wastewater | 22 | lb/hr | 9.98 | kg/hr |
| Solid waste | 22 | lb/hr | 9.98 | kg/hr |
| **Air emissions** | | | | |
| $SO_2$ | 3.2 | lb/hr | 1.45 | kg/hr |
| NO | 3.7 | lb/hr | 1.68 | kg/hr |
| $CO_2$ | 1509 | lb/hr | 684.47 | kg/hr |
| CO | 7 | lb/hr | 3.18 | kg/hr |

| Table D-9 Projected Operational Emissions (tpy) | | | | |
|---|---|---|---|---|
| **Criteria Pollutant** | **Flare Exhaust** | **Regenerator Exhaust** | **Boiler** | **Total** |
| $SO_2$ | 1.16 | | | **1.16** |
| CO | 3.5 | | | **3.5** |
| $NO_x$ | 1.22 | | 0.02 | **1.24** |
| $PM_{10}$ | 0.01 | 0.01 | | **0.02** |

# APPENDIX D2

Small Source Exemption Registration

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State of Utah

GARY R. HERBERT
*Governor*

GREG BELL
*Lieutenant Governor*

Department of
Environmental Quality

Amanda Smith
*Executive Director*

DIVISION OF AIR QUALITY
Cheryl Heying
*Director*

## Small Source Registration

DAQE-EN0143320001-10

September 7, 2010

Harry Gatley
Viresco Energy
1451 Research Park Drive #200
Riverside, CA 92507

Dear Mr. Gatley:

Re: Request for Evaluation of Compliance with Rule R307-401-9, UAC: Exemptions and Special Provisions - Small Source Exemptions - De Minimis Emissions
Project Fee Code: N014332-0001

The Utah Department of Environmental Quality, Division of Air Quality (DAQ) has reviewed your letter, dated August 19, 2010, requesting a small source exemption for Viresco Energy: Hydrogasification Fluidized-Bed Pilot Facility located at: Sec 10, T44S, R6W, Salt Lake base and meridian, SW4NW4NW4, Section 10, Kane County, and determined that the small source exemption applies as long as the above-referenced equipment and associated processes are operated as specified in the Registration Request.

The small source exemption does not exempt a source from complying with other applicable federal, state, and local regulations including the current Utah Administrative Code. If you change your operation such that there is an increase in the emissions submitted to DAQ, it is recommended that you notify us as an Approval Order may be required.

The fee for issuing the small source/de minimis designation is the cost, as authorized by the Utah Legislature of the actual time spent by the Review Engineer and all other staff on the project, and a one-time filing fee. Payment should be sent to the DAQ upon receipt of the invoice.

195 North 1950 West • Salt Lake City, UT
Mailing Address: P.O. Box 144820 • Salt Lake City, UT 84114-4820
Telephone (801) 536-4000 • Fax (801) 536-4099 • T.D.D. (801) 536-4414
www.deq.utah.gov
Printed on 100% recycled paper

DAQE-EN0143320001-10
Page 2

Thank you for informing the DAQ of this process. If you have any additional questions, please contact Chad Harris at (801) 536-4069.

Sincerely,

M. Cheryl Heying, Executive Secretary
Utah Air Quality Board

Timothy R. Andrus, Manager
New Source Review Section

MCH:TRA:CDH:sa

Attachments: Small Source Exemption Registration Request and attached forms

# Utah Division of Air Quality
## SMALL SOURCE EXEMPTION REGISTRATION

Revised: 6/21/06

Businesses **eligible** for this exemption shall **not**: 1) **emit more than 5 tons per year** of each of the following pollutants: sulfur dioxide ($SO_2$), carbon monoxide (CO), nitrogen oxides ($NO_x$), particulate matter ($PM_{10}$), ozone ($O_3$), or volatile organic compounds (VOCs) or 2) **emit more than 500 pounds per year of any single hazardous air pollutant** (HAP), and **emit more than 2000 pounds per year for any combination of HAPs**, or 3) emit less than 500 pounds per year of any air contaminant not listed in (1)( or (2) above and less than 2000 pounds per year of any combination of air contaminants not listed in (1) or (2) above.

*Please keep copies of the registration notice and worksheets on site at your business to verify your permit exemption status. Please be aware that the small source exemption only exempts your business from the permitting requirements of R307-401-5 through 8 of the Utah Administrative Code, not other applicable air quality regulations.*

| | |
|---|---|
| 1. Business Name and Mailing Address:<br>VIRESCO ENERGY<br>1451 RESEARCH PARK DR #200<br>RIVERSIDE, CA 92507<br>Phone # (951) 784-7238<br>Fax # (951) 784-7287 | 2. Business Contact for Air Quality Issues:<br>HARRY GATLEY<br>4876 DAMON CIRCLE<br>HOLLADAY, UT 84117<br>(801) 272-2411<br>Phone # (801) 243 5373<br>Fax # (951) 784-7287 |
| 3. Owners Name and Mailing Address:<br>VIRESCO ENERGY<br>1451 RESEARCH PK. DR. #200<br>RIVERSIDE, CA 92507<br>Phone # (951) 784-7238<br>Fax # (951) 784 7287 | 4. Business Location (street address if different from above and directions to site):<br>TOWNSHIP 44 SOUTH<br>RANGE 6 WEST, SLB&M<br>SW4NW4NW4, SECT 10 |
| 5. County where business is located:<br>KANE COUNTY | 6. Start-up Date of Business:<br>Month: _____ Year: 2011 |

7. Briefly describe your process by describing end products, raw materials, and process equipment used at your business. Attach additional sheets if necessary.

HYDROGASIFICATION FLUIDIZED BED PILOT FACILITY RAW MAT - COAL, BIOMASS, LIMESTONE - NO PRODUCTS: EQUIPMENT: BOILER, GASIFIER, CONDENSER, $H_2$ SEPARATOR, GTL PROCESS, MAT. HANDLING P&ID'S AVAILABLE ON REQUEST

AUG 19 2011

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA
U.S. DEPARTMENT OF ENERGY

August 11, 2011

Dear Reader:

The enclosed draft environmental assessment (EA) for the Utah Coal and Biomass Fueled Pilot Plant Project, Kanab, Utah, (Draft EA-1870D) was prepared by the U.S. Department of Energy (DOE) in accordance with the Council on Environmental Quality's National Environmental Policy Act (NEPA) implementing regulations (40 CFR Parts 1500 to 1508) and DOE's NEPA implementing procedures (10 CFR Part 1021). The draft EA evaluates the potential environmental impacts of DOE providing cost-shared funding under a cooperative agreement with Viresco Energy, LLC, (Viresco) for its construction and operation of a pilot-scale gasification facility. The objective of Viresco's proposed project is to conduct a pilot-scale evaluation of the Steam Hydrogasification Reaction process to determine the technical feasibility of using steam hydrogasification to convert coal and biomass such as agricultural or wood processing waste into synthesis gas, and ultimately into clean domestic fuels. The plant would receive and process a maximum of 5 tons of coal or coal-biomass mixtures per day. The plant would be located on approximately 1.5 acres about 2.5 miles south of Kanab in Kane County, Utah.

DOE's proposed action would meet the requirements of the Congressional earmark in the Fiscal Year 2010 Appropriations Act (Public Law 111-85) and its accompanying Conference Report (Conf. Rep. 111-278 (Sept. 30, 2009)). The technology that the plant would demonstrate at a pilot-scale may be capable of producing fuels from domestic coal and renewable resources. The successful operation of the proposed pilot plant would provide engineering information needed to develop a commercialization pathway for this process. The addition of biomass to the coal feedstock also reduces net greenhouse gas emissions. Under the cost-sharing agreement, DOE would provide $2,404,000 (approximately 80 percent of the total cost of the research and development project) and Viresco would contribute the remaining $601,000.

The draft EA evaluates the potential environmental impacts of Viresco's proposed project. Viresco would operate the facility and collect data for 30 days of operation over a period of months under DOE's cooperative agreement; after DOE's financial assistance ends, Viresco plans to seek additional funding for continued operations. These operations would be limited by funding available and are not expected to exceed 130 days of operation in any year, including a possible 90-day continuous test run. DOE considers the possible continued operation of the pilot plant as a connected action under NEPA in the EA.

The draft EA evaluates 13 environmental resource areas and identifies no significant adverse environmental impacts for the proposed project. Based on initial screening evaluations, DOE determined that no or negligible impacts would occur in three of these resource areas. Additional impact evaluations for air quality, greenhouse gases, soils, groundwater, materials and waste, utilities, and public health and safety identified minimal impacts from the proposed project's construction and operation. Impact evaluations for aesthetics and land use indicated minor to moderate impacts. In this draft EA, potential cumulative impacts of the proposed project with

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other past, present, or future actions are also evaluated, and adverse cumulative impacts from negligible to minor were identified. The proposed project would also have the beneficial socioeconomic impact of creating jobs during construction and operation.

DOE will publish a Notice of Availability in the *Southern Utah News* on August 17, 2011, and in *The Spectrum & Daily News* on August 21, 22 and 23, 2011 to announce the beginning of the 30-day public review and comment period. As stated in the notice, comments should be marked "Utah Coal and Biomass Fueled Pilot Plant Project Draft EA Comments" and sent to:

Mr. Joseph Zambelli
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
M/S: B07
P.O. Box 880
Morgantown, WV 26507-0880
Email: joseph.zambelli@netl.doe.gov
Fax: 304-285-4403

Individual names and addresses, including email addresses, which DOE receives as part of the comment process, are normally considered part of the public record. Persons who wish to withhold name, address, or other identifying information from the public record must state this request prominently at the beginning of the comment document. DOE will honor this request to the extent allowable by law. All submissions from organizations, businesses, and individuals who identify themselves as representatives or officials of organizations or businesses will be included in the public record and open to public inspection in their entirety.

The public comment period formally begins on August 18, 2011, and ends on September 16, 2011. DOE will consider late submissions to the extent practicable. The draft EA can also be accessed from DOE's National Energy Technology Laboratory (NETL) website at http://www.netl.doe.gov/publications/others/nepa/ea.html.

Sincerely,

Joseph Zambelli

Joseph Zambelli
NEPA Document Manager

8. List any pollution control equipment: Low $NO_x$ BURNER

9. Typical operating Schedule: 8h/day 5 days/week

10. **Annual Emission Rates:**
Provide an estimate of the actual annual emissions of the following air contaminants from your business. Emission calculation worksheets are available for some common processes.
**Please attach all worksheets and calculations.**

| | | | |
|---|---|---|---|
| Sulfur Dioxide ($SO_2$)..... | 0 lbs / year | Particulate Matter ($PM_{10}$) ..... | 0 lbs / year |
| Carbon Monoxide (CO) | 553 lbs / year | Ozone ($O_3$) ..... | 0 lbs / year |
| Nitrogen Oxides ($No_x$) | 118 lbs / year | Volatile Organic Compounds (VOC) | 0 lbs / year |
| Other Air Contaminants | 0 lbs / year | Describe | |

**HAZARDOUS AIR POLLUTANTS:** See Attached

Complete Attachment C before selecting one of the following emission estimate ranges.
For an individual hazardous air pollutant:
0 - 250 lbs/year: _____ 250-350 lbs/year: _____ 350-500 lbs/year: _____
For a combination of hazardous air pollutants:
0-1000 lbs/year: _____ 1000-1500 lbs/year: _____ 1500-2000 lbs/year: _____

11. ☐ By checking this box, I hereby certify that the information and data submitted in this notice fully describes this site and only this site and is true, accurate, and complete, based on reasonable inquiry and to the best of my knowledge. I recognize that falsification of the information and data submitted in this notice is a violation of R19-2-115, Utah Administrative Code.

☐ By checking this box, I understand that I am responsible for determining whether I remain eligible for this exemption before making operational or process changes in the future and agree to notify the Division of Air Quality when this business is no longer eligible for this exemption.

Signature of Owner/Manager: Harry J. Gatley Title: CHIEF ENGINEER

Print Name: HARRY J. GATLEY Phone #: (801) 272-2411 Date: 8-17-2010

Division Reviewer: Chad H Date: 8/25/10

Small Source Applicable Yes X No ___

LICENSED PROFESSIONAL ENGINEER
8-17-2010
No. 188365
HARRY J. GATLEY
STATE OF UTAH