Environmental Review Form for Argonne National Laboratory

Click on the blue question marks (?) for instructions, contacts, and additional information on specific line items.

(?)**Project/Activity Title**: Construction and Operation of the Materials Engineering Facility

(?)**ASO NEPA Tracking No.** ASO-CX-270 (?)**Type of Funding**: DOE and DOD
B&R Code

(?)**Identifying number**: WFO proposal # DOD-P10063 CRADA proposal #
Work Project # 0108A ANL accounting # (item 3a in Field Work Proposal) FWP-49519
Other (explain) DOE-ARRA –project # 2001140 & DOE Operating Funds-49727-00-155

(?)**Project Manager**: Greg Krumdick Signature: Date: 8-4-2010

Robert Swale Signature: Date: 8-4-2010

(?)**NEPA Owner**: Roberta Riel Signature: Roberta Riel Date: 8/4/2010

(?)**NEPA Owner**: Phil Rash Signature: Date: 8.4.2010

ANL NEPA Reviewer: *M. A. Kamiya* Signature: Date: 8/16/2010

I. (?)**Description of Proposed Action:**

The DOE program office for Energy Efficiency and Renewable Energy (EERE) approved an ARRA funded three-part proposal submitted by Argonne National Laboratory. One of the three parts was awarded to the Energy Systems Division. This ERF will addresses the ES Division portion of this proposal, *Material Production Scale-Up and Characterization Equipment (known as the Materials Engineering Facility (MEF))*.

In order to conduct preliminary interim scale-up experimental activities in Bldg. 362, 369, 370 and construct and operate the MEF facility, ES has received funding from the following sources:

1. FWP-49519- Organosilicon Electrolyte Synthesis Scale-Up (ERF completed and approved 06/2009)
2. DOE-ARRA –project # 2001140-Materials Production Scale-Up and Characterization Equipment.
3. DOD-WFO-P10063-Additional Money to Enhance/Expand the Materials Scale-Up Facility (ES) (Approved 05/2010 for Project planning and procurement of Equipment.)
4. DOE Operating Funds-49727-00-155- Battery Materials Scale-Up Research

This project would design and build a laboratory and pilot scale materials research facility (Materials Engineering Facility (MEF)). The purpose of MEF would be to provide the tools necessary to rapidly scale up bench-scale battery chemistries and enable quick turnaround validation of new materials chemistries. This facility would be highly flexible, highly instrumented, pilot scale laboratory facility at Argonne to support new and enhanced R&D into advanced energy storage technologies (batteries, ultra-capacitors, asymmetric or hybrid ultra-capacitors) for automotive applications. Applications would include Plug-In Hybrid Electric

Vehicles (PHEVs) and other electric drive vehicles such as Hybrid Electric Vehicles (HEVs), Electric Vehicles (EVs), and micro-hybrids. The ability to scale up and test new materials in larger more representative cells would permit more robust and useful screening of those materials. Such a facility is the missing link between the bench scale development of battery technology and battery manufacturers adopting the new technologies for transportation applications. The need for a dedicated research facility to support the generation of materials for battery prototyping has been recognized throughout the industry.

The ES Division Materials Engineering Facility (MEF) will have three phases:

1. Interim scale up of battery material chemistries (5-70 liter range)-in existing, but specially equipped facilities. These interim facilities would require minor facility modifications such as: addition of explosion proof blowers, electrical upgrades, and ventilation upgrades to include canopy hoods. This work would be coordinated and reviewed with FMS and IH as required.

Argonne Building No.	Type of Work Space	Typical volume for each reaction or formulation (liters)
362	One or more conventional laboratories equipped for greater than bench-scale chemical processing.	< 20
369	Existing work area in a high-bay area	< 30
370	Existing work area in a high-bay area	< 70

2. Design, construction, and commissioning of the Material Engineering Facility (MEF)-a specially designed highly flexible, automated, and instrumented pilot scale facility. This facility would allow (5-200 liters) with rigorous hazard controls.

3. Operation of the pilot scale Material Engineering Facility.

The Material Engineering Facility would be a structure that is designed and built within the existing Building 370 high bay. The structure would house wet labs, offices, a conference room and high bay space for the purpose of conducting the scale-up battery chemistry research.

The facility would include high-hazard, Group H, (H-1, H-2, H-3 andH-4), pilot and high-bay laboratory spaces due to the presence of significant quantities of hazardous material needed to conduct the applied research. The exact configuration of the facility and its distribution of space sizes and types would be established during the facility conceptual design.

The current facility design concept is presented in Figure 1. As shown, the proposed ~10,000ft2 facility includes three pilot labs, three high-bay labs, a characterization lab, and a control room. The final configuration of the facility and its distribution of space sizes and types would be established during the facility preliminary design based on available space and detailed analysis of code requirements (i.e., NFPA, IBC, and other applicable codes and standards) needed to build such a facility in building 370. .

Construction activities for both the MEF Facility and the interim scale-up activities would use currently existing utilities. Minor modifications would need to be made to these existing utilities to meet the requirements of the new facilities. Modifications such as re-routing available power to new panels and transformers and re-routing existing chilled water. Depending on available chilled water capacity a supplemental supply of chilled water may be required. . Demolition activities would include removal of existing aged motor control centers, conduit, floor repair/resurfacing and grinding and other miscellaneous small demolition activities (e.g. removing piping, etc)

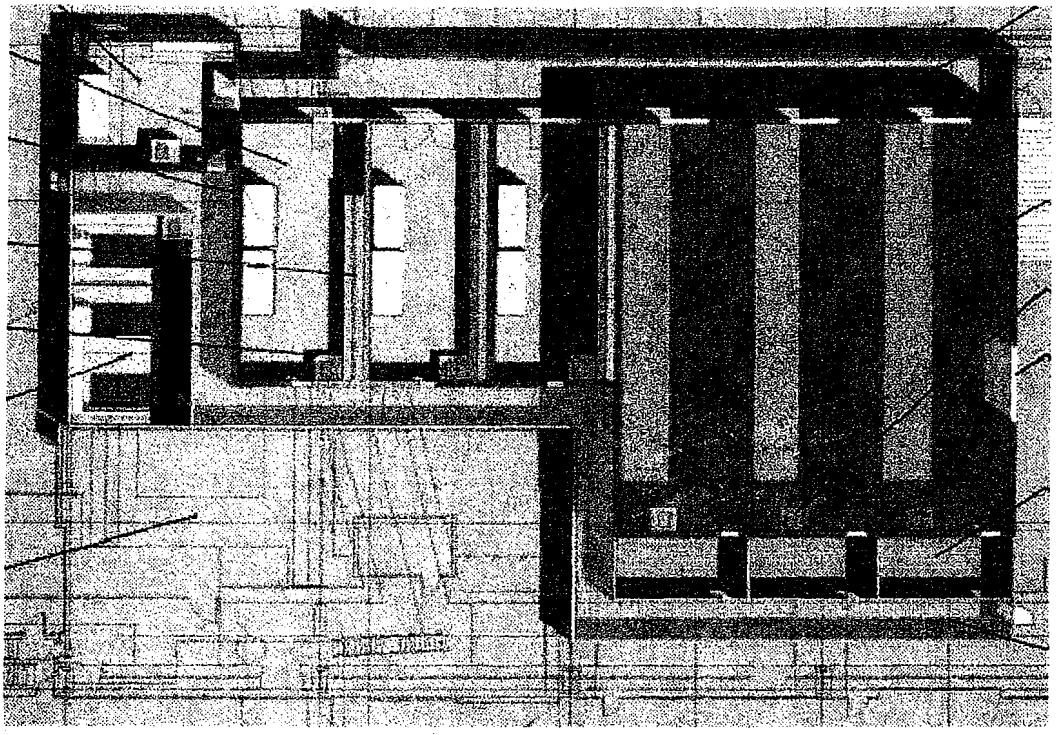

Figure 1. Materials Engineering Facility Design Concept—*The design concept designates the high bays for production of active materials and electrolyte. Actual high-bay use would depend on the specific user requirements.*

II. (?)**Description of Affected Environment:** Interim experimental scale-up activities in building 362, 369, & 370 and the Materials Engineering Facility (MEF) building would be performed in an existing buildings and areas that have been previously disturbed.
The proposed addition of the MEF within building 370 and interim scale up activities would have no significant environmental impact. Existing utilities are planned to be used; however, connections of the lab sinks, condensate, eyewashes, would be connected to the laboratory sewer. In building 362, exhaust would be vented out of the laboratories by chemical hoods, which discharge out on the roof of the building. In building 369, exhaust would be vented out of the high bay using existing duct work that discharges outside of the building or new duct work that will discharge 10ft above the roof line. In building 370, new exhaust stacks would be installed 10 ft. above the roof line.

III. (?)**Potential Environmental Effects:** (Attach explanation for each "yes" response. **See Instructions for Completing Environmental Review Form)**

A. Complete Section A for all projects.

1. (?)Project evaluated for Pollution Prevention and Waste Minimization opportunities and details provided under items 2, 4, 6, 7, 8, 16, and 20 below, as applicable — Yes X No ___

   Minimal amounts of chemicals will be used during the construction process. Wastes that can be recycled (i.e. metal scrap) will be to minimize waste generation.

2. (?)Air Pollutant Emissions — Yes X No ~~X~~ (We)

Operations of both the interim projects and the MEF facility would generate ammonia gas up to approximately 20 L/min. This gas will be scrubbed with a commercial sulfuric acid scrubber that has over 99% removal efficiency. Ammonia levels in the effluent gas stream should be in the ppm range, which would be vented outside of the building. No construction permit is required per ESQ Environmental Compliance. However, the determination of insignificant activity would be evaluated with the IEPA.

3.(?)Noise Yes X No ___

Construction of the Materials Engineering Facility may generate noise from the use of construction equipment including but not limited to jack hammers, cutting equipment and front end loaders.

Argonne has an established hearing protection program in which the OSHA standard for noise would be followed.

4. (?)Chemical Storage/Use Yes X No ___

Construction of the Materials Engineering Facility may use typical construction chemicals including but not limited to cements, PVC primer & cement, epoxy and paints.

The inventory of chemicals would not be excessive relative to the amount required to conduct the research, thus minimizing disposal of unneeded materials. Incompatible chemicals would be segregated. All storage of chemicals would conform to the requirements in Argonne's Environment, Safety and Health Manual or LMS Procedures. The inventory of chemicals would be entered into Argonne's centralized electronic inventory system.

The MEF facility would use large volumes of flammable, toxic, carcinogenic, corrosive, and water reactive chemicals (multiple 55 gallon drums of flammables/combustibles and 300 gallon DOT approved shipping totes (of corrosives). The chemicals may change depending on the battery chemistries and materials that are tested. The chemicals to be used would fall into the general chemical categories listed below. Below are some examples of chemicals to be used but other chemicals would not be limited as long as any new chemicals fall into the general chemical categories below.

1. **Corrosives**- (e.g. sulfuric acid, triethylamine, sodium hydroxide, ammonium hydroxide, etc.)
2. **Carcinogens**- (e.g. Nickel containing compounds , benzene, cobalt sulfate, cobalt hydroxide, cobalt acetate, nickel sulfate, nickel hydroxide, nickel acetate, lithium nickel oxide, etc.)
3. **Flammables**-Class 1B flammables and Class IIIA combustibles such as:
   (e.g. Organosilicon electrolytes, Tri(ethyl glycol) monomethyl ether, di(ethylene glycol) methyl ether, charcoal activated, Hexamethyldisilazane (HDMS), CH3)3SiO(CH2CH2O)3CH3 – 1NM3, ethanol, isopropanol, N-methyl-2-Pyrrolidinone (NMP), lithium hexafluorophosphate in ethylene carbonate, graphite powder suspended in NMP with polyvinylidene (PVDF) binder, lithiated nickel-cobalt-maganese oxide powder suspended in NMP with polyvinylidene (PVDF) binder, trimethylchlorosilane, hexamethyldisilazane, triethylamine allyl bromide, pentamethyl disiloxane, toluene, tetrahydrofuran, acetone, n-heptane, isopropanol, platinum on active carbon, sodium hydride, etc.)
4. **Gases Used**

a. He, Ar, N2, O2 regen gas (4%H2 in He)
b. Toxic/flammable/ and carcinogenic Gases-ethylene oxide
c. Toxic gases-ammonia

5. **Gases Generated**
   d. NH3 – ammonia-Maximum expected is 0.164 ton/yr.
   e. CO2-carbon dioxide maximum expected is 0.55 tons/yr
   f. O2
6. **Nanomaterials-** (e.g. Acetylene black powder suspended in binder, lithium titanium oxide)
7. **Pyrophoric/water reactive-** (e.g. sodium hydride, trimethylchlorosilane, hexamethyldisilazane, etc.)
8. **Peroxide Formers-** (e.g. tetahydrofuran, etc.)
9. **Toxic-**(e.g. Nickel and lithium containing compounds (e.g. nickel sulfate, nickel hydroxide, nickel acetate, lithium nickel oxide, lithium trifluorosulfonimide salt, triethylamine allyl bromide, manganese sulfate, and manganese acetate, etc.)
10. **Carbonates-**(e.g. sodium carbonate, ammonium hydrogen carbonate, lithium carbonate, and potassium carbonate, etc.)
11. **Oxides-**(e.g. lithium cobalt oxide, sodium manganese oxide, aluminum oxide, magnesium oxide, titanium oxide, etc.)

The MEF facility would have engineering controls to account for high volumes and hazards associated with the battery material chemistries (e.g. chemicals hoods, non-sparking motors, blow out panels, bag houses, air monitoring , safety switches for moving parts, etc)

Spill Control- In the interim facilities, metal spill pans would be placed under glass equipment that contain flammable liquids sized to contain over 100% of the volume of the liquid used.

The MEF facility-Any 55 gallon drums would be on secondary containment. The equipment will be jacketed double walled units; in addition, adsorbents will be available for use. These adsorbents would be disposed following the Argonne Waste Procedures Manual.

5. (?)Pesticide Use — Yes ___ No X

6. (?) Polychlorinated Biphenyls (PCBs) — Yes ___ No X

7. (?) Biohazards — Yes ___ No X

8. (?)Liquid Effluent (wastewater) — Yes X No ___

Discharges from sinks and condensate would be piped by pumping or gravity to the laboratory or sanitary sewer system, whichever is required. Argonne policies and procedures prohibit disposal of hazardous material in any drains. The proposed laboratory and high bay sinks would drain to the laboratory sewer.

9. (?)Waste Management

a) Construction or Demolition Waste — Yes X No ___

Construction of the Materials Engineering Facility may generate typical construction wastes including but not limited to concrete, cinder blocks, metal scraps, excess wiring and roofing materials. Construction debris would be recycled where possible.

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b) Hazardous Waste — Yes X No ___

All RCRA hazardous waste generated during facility operations would be accumulated (in a Satellite Accumulation Area(s)) by qualified personnel who underwent Argonne-specific training. Requisitions for transfer of accumulated hazardous waste to a central on-site facility would be completed by Argonne-certified personnel. The research personnel would conform to the requirements in Argonne's Hazardous Waste Handling Procedures Manual. All on-site treatment, storage, and disposal would be performed in accordance with the RCRA Part B permit issued by the IEPA. The accumulated hazardous waste would be disposed in accordance with Argonne's Part B permit, and in accordance with the requirement in Argonne's Waste Handling Procedures Manual.

The ammonia gas would be scrubbed with a scrubber using 10% sulfuric acid. The scrubbing of the ammonia would generate ammonium sulfide which would be processed by waste management. Approximately 55 gallons of ammonium sulfide / sulfuric acid solution would be generated.

Any unused feed chemicals would be initially placed on the excess chemical inventory and if no new uses are found they will be disposed of by Argonne's waste management.

The majority of the product generated would be sent back to the user, analytical labs, and battery manufacturers for testing. Any unwanted product would be logged into the SAA and disposed of by Waste Management.

c) Radioactive Mixed Waste — Yes ___ No X
d) Radioactive Waste — Yes ___ No X
e) PCB or Asbestos Waste — Yes X No ___

Any asbestos abatement would be minor in scale, and limited to the demolition phase of construction or renovation activities. The Illinois EPA would be notified as required, and the asbestos removed and disposed following the Argonne Waste Handling Procedures Manual and IEPA regulations.

f) Biological Waste — Yes ___ No X
g) No Path to Disposal Waste — Yes ___ No X
h) Nano-material Waste — Yes X No ___

Nanomaterials would eventually be incorporated into battery-related materials to enhance performance, including materials produced by advanced technology nanopowder atomic layer deposition reactors. Nanomaterial waste would be disposed of following the Waste Handling Procedures Manual.

10. (?)Radiation — Yes ___ No X

11. (?)Threatened Violation of ES&H Regulations or Permit Requirements — Yes ___ No X

12. (?)New or Modified Federal or State Permits — Yes ___ No X

No construction permit is required. However, the determination of insignificant activity potentially affecting facility operations would be evaluated with the IEPA.

13. (?)Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste — Yes ___ No X

14. (?)Public Controversy — Yes ___ No X

15. (?)Historic Structures and Objects — Yes ___ No X

16. (?)Disturbance of Pre-existing Contamination — Yes ___ No X

17. (?)Energy Efficiency, Resource Conserving, and Sustainable Design Features — Yes X No ___

The Materials Engineering Facility would be designed and built to meet the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings per DOE Order 430.2b .

B. For projects that will occur outdoors, complete Section B as well as Section A.

18. (?)Threatened or Endangered Species, Critical Habitats, and/or other Protected Species — Yes ___ No X

19. (?)Wetlands — Yes ___ No X

20. (?)Floodplain — Yes ___ No X

21. (?)Landscaping — Yes ___ No X

22. (?)Navigable Air Space — Yes ___ No X

23. (?)Clearing or Excavation — Yes ___ No X

24. (?)Archaeological Resources — Yes ___ No X

25. (?)Underground Injection — Yes ___ No X

26. (?)Underground Storage Tanks — Yes ___ No X

27. (?)Public Utilities or Services — Yes ___ No X

28. (?)Depletion of a Non-Renewable Resource — Yes ___ No X

C. For projects occurring outside of ANL complete Section C as well as Sections A and B. N/A

29. (?)Prime, Unique, or Locally Important Farmland — Yes ___ No ___

30. (?)Special Sources of Groundwater (such as sole source aquifer) — Yes ___ No ___

31. (?)Coastal Zones — Yes ___ No ___

32. (?)Areas with Special National Designations (such as National Forests, Parks, or Trails) — Yes ___ No ___

33. (?)Action of a State Agency in a State with NEPA-type Law — Yes ___ No ___

34. (?)Class I Air Quality Control Region Yes ___ No ___

IV. (?)Sub
part D Determination: (to be completed by DOE/ASO)

Are there any extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal? Yes ___ No X

Is the project connected to other actions with potentially significant impacts or related to other proposed action with cumulatively significant impacts? Yes ___ No X

If yes, is a categorical exclusion determination precluded by 40 CFR 1506.1 or 10 CFR 1021.211? Yes ___ No ___

Can the project or activity be categorically excluded from preparation of an Environment Assessment or Environmental Impact Statement under Subpart D of the DOE NEPA Regulations? Yes X No ___

If yes, indicate the class or classes of action from Appendix A or B of Subpart D under which the project may be excluded. B. 3.6 Siting / construction / operation of facilities for bench scale / small scale R & D and pilot projects.

If no, indicate the NEPA recommendation and class(es) of action from Appendix C or D to Subpart D to Part 1021 of 10 CFR.

ASO NEPA Coordinator Review: Ken Chiu

Signature: Ken Chiu Date: 8/20/10

ASO NCO Approval of CX Determination:
The preceding pages are a record of documentation that an action may be categorically excluded from further NEPA review under DOE NEPA Regulation 10 CFR Part 1021.400. I have determined that the proposed action meets the requirements for the Categorical Exclusion identified above.

Signature: Date: 8/20/10

Peter R. Siebach
Acting Argonne Site Office NCO

ASO NCO EA or EIS Recommendation: N/A

Class of Action: ___

Signature: ___ Date: ___

Peter R. Siebach
Acting Argonne Site Office NCO

Concurrence with EA or EIS Recommendation:

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CH GLD: N/A

Signature: _____ Date: _____

ASO Manager Approval of EA or EIS Recommendation:

An ____ EA ____ EIS shall be prepared for the proposed _____ and

_____ shall serve as the document manager.

Signature: _____ Date: _____

Dr. Joanna M .Livengood
Acting Manager