



**Environmental Review Form for Argonne
National Laboratory**

Form:	ANL-985
Version:	5
Your Form ID:	ANL-985-1670
Form Status:	Approved
Date:	8/11/2021 3:37:58 PM
Created By:	Woodford, John B.

Creator

Badge:	51790	Name:	Woodford, John B.
Cost Center:	254	Division:	WSH
Job Title:	Safety Specialist 5	Employee Type:	Regular Full-Time Exempt
Building:	208	Lab Extension:	2-0910

General Information

Project/Activity Title: Stable Salt Reactor - Applied
ASO NEPA Tracking No.: Type of Funding:
 B & R Code: Identifying Number: CRADA-2021-21128
SPP Proposal Number: CRADA Proposal Number: 2021-21128
Work Project Number: ANL Accounting Number: (Item 3a in Field Work Proposal)
Other (explain):
List appropriate NEPA Owners:
Division: NSE NEPA Owner:
Division: CFC NEPA Owner:

Financial Plans

To select a Financial Plan, click the magnifying glass icon to open a search window.
Cost Center: Project: Phase: Task:

Description of Proposed Action

The overall research project entails the development of a "digital twin" for Moltex Energy's Stable Salt Reactor - Wasteburner (SSR-W); that is, a detailed model of all aspects of the reactor's operation. In order to verify the thermal hydraulic aspects of the model and study the heat transfer properties of Moltex's proposed molten salt coolant, a molten salt loop would be constructed and operated at Argonne. The loop would be composed of stainless steel, and would hold up to 100 L molten salt. Some amount of corrosion would be anticipated, and the loop material wall thickness would be selected based on the planned lifetime of the project. The salt would be the NaCl/MgCl₂ eutectic composition, which melts around 500°C. The bulk of the salt would be held in a reservoir. During tests it would be heated to between 550-700°C and pumped through the loop using a pump designed for this use and made from materials compatible with the salt. Instrumented surrogate fuel pin test pieces would be immersed in the salt, and their temperature profiles measured over the course of the test. Tests would require maintaining the loop at temperature for at least a week, and tests would take place unattended. Further studies could entail using different test piece geometries, adding impurities to the molten salt to simulate degradation or contamination of the coolant and examining their effects on its heat transfer properties, or using different compositions of molten salt. It is possible that the molten salt would need to be purified during the course of the project, either ex situ or in situ. The purification process would involve use of Mg metal, and would generate both hydrogen gas and chlorine gas. The process would be designed to maintain a sufficiently low rate of hydrogen generation so as not to create an explosive mixture in the exhaust. A scrubber would be put on the exhaust to remove chlorine, and a chlorine sensor would be put into place downstream of the scrubber to shut off purification if the scrubber fails.

Description of Affected Environment

The loop is proposed to be constructed in Building 205 Room J-101, a nonradiological laboratory space, in a stainless steel sheet walk-in hood with a stainless steel pan underneath it capable of holding the entire volume of salt in the loop, in the event of a serious leak. Due to the possibility of HCl production on contact with moisture, the Argonne Fire Department would be notified of construction in advance, to allow them time to incorporate the information into their incident pre-plans for Building 205.

Potential Environmental Effects

- Attach explanation for each "yes" response near bottom of form.
- **See Instructions for Completing Environmental Review Form.**

Section A (Complete For All Projects)		Yes	No	Explanation
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	<input checked="" type="radio"/>	<input type="radio"/>	The loop would be constructed to be as small as possible given the mission needs, so as to minimize material use and energy consumption. It would also be insulated; primarily to maintain an even temperature, but also to reduce energy use.
2.	Air Pollutant Emissions	<input type="radio"/>	<input checked="" type="radio"/>	
3.	Noise	<input type="radio"/>	<input checked="" type="radio"/>	
4.	Chemical/Oil Storage/Use	<input checked="" type="radio"/>	<input type="radio"/>	The salt mixture in the loop would be an NaCl/MgCl ₂ eutectic mixture. Solvents would be used to clean components before assembly. Magnesium metal might be used to purify the salt, and the purification process would generate both hydrogen gas and chlorine gas. The exhaust from the purification process would be passed through a scrubber to ensure that no chlorine was released, and a chlorine sensor would be put into place downstream of the scrubber to shut off the purification process if the scrubber failed. If moisture contacts the salt while it's at temperature, HCl would be formed. There is a possibility that future work could involve fluoride salts, which would have the potential to form HF on contact with moisture. To minimize the possibility of water ingress, the loop would be constructed in a walk-in hood, and the Argonne Fire Department would be notified of the presence of water-reactive material in the lab. In order to determine the presence and extent of corrosion in the loop, the salt mixture would be analyzed for the presence of divalent chromium (Cr(II)); this is a product of chloride corrosion of stainless steel. Alternate salt compositions with similar safety and environmental profiles may also be used on conclusion of the main testing campaign.
5.	Pesticide Use	<input type="radio"/>	<input checked="" type="radio"/>	
6.	Toxic Substances Control Act (TSCA) Substances			
6a.	Polychlorinated Biphenyls (PCBs)	<input type="radio"/>	<input checked="" type="radio"/>	
6b.	Asbestos or Asbestos Containing Materials	<input type="radio"/>	<input checked="" type="radio"/>	
6c.	Other TSCA Regulated Substances	<input type="radio"/>	<input checked="" type="radio"/>	
6d.	Import or Export of Chemical Substances	<input type="radio"/>	<input checked="" type="radio"/>	
7.	Biohazards	<input type="radio"/>	<input checked="" type="radio"/>	
8.	Effluent/Wastewater (If yes, see question #12 and contact Peter Lynch (HSE) at 2-4582 or lynch@anl.gov)	<input type="radio"/>	<input checked="" type="radio"/>	
9.	Waste Management			

	9a.	Construction or Demolition Waste	<input type="radio"/>	<input checked="" type="radio"/>	
	9b.	Hazardous Waste	<input checked="" type="radio"/>	<input type="radio"/>	Small amounts of solvent waste may be produced as a result of component cleaning operations. Cleanup after an incident involving contact between the salt and moisture could involve hydrochloric and/or hydrofluoric acids. All on-site handling, storage and disposal would be performed in accordance with the RCRA part B permit issued by the IEPA. Any accumulated hazardous waste would be disposed of in accordance with Argonne's Part B permit and in accordance with the requirements in LMS-PROC-103.
	9c.	Radioactive Mixed Waste	<input type="radio"/>	<input checked="" type="radio"/>	
	9d.	Radioactive Waste	<input type="radio"/>	<input checked="" type="radio"/>	
	9e.	Asbestos Waste	<input type="radio"/>	<input checked="" type="radio"/>	
	9f.	Biological Waste	<input type="radio"/>	<input checked="" type="radio"/>	
	9g.	No Path to Disposal Waste	<input type="radio"/>	<input checked="" type="radio"/>	
	9h.	Nano-material Waste	<input type="radio"/>	<input checked="" type="radio"/>	
10.	Radiation		<input type="radio"/>	<input checked="" type="radio"/>	
11.	Threatened Violation of ES&H Regulations or Permit Requirement		<input type="radio"/>	<input checked="" type="radio"/>	
12.	New or Modified Federal or State Permits		<input type="radio"/>	<input checked="" type="radio"/>	
13.	Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste		<input type="radio"/>	<input checked="" type="radio"/>	
14.	Public Controversy		<input type="radio"/>	<input checked="" type="radio"/>	
15.	Historic Structures and Objects		<input type="radio"/>	<input checked="" type="radio"/>	
16.	Disturbance of Pre-existing Contamination		<input type="radio"/>	<input checked="" type="radio"/>	
17.	Energy Efficiency, Resource Conserving, and Sustainable Design Features		<input checked="" type="radio"/>	<input type="radio"/>	.The loop would be insulated to maintain an even temperature, and to reduce energy use.
Section B (For Projects that Occur Outdoors)			Yes	No	
18.	Threatened or Endangered Species, Critical Habitats, and/or other Protected Species		<input type="radio"/>	<input type="radio"/>	
19.	Wetlands		<input type="radio"/>	<input type="radio"/>	
20.	Floodplain		<input type="radio"/>	<input type="radio"/>	
21.	Landscaping		<input type="radio"/>	<input type="radio"/>	

22.	Navigable Air Space	<input type="radio"/>	<input type="radio"/>	
23.	Clearing or Excavation	<input type="radio"/>	<input type="radio"/>	
24.	Archaeological Resources	<input type="radio"/>	<input type="radio"/>	
25.	Underground Injection	<input type="radio"/>	<input type="radio"/>	
26.	Underground Storage Tanks	<input type="radio"/>	<input type="radio"/>	
27.	Public Utilities or Services	<input type="radio"/>	<input type="radio"/>	
28.	Depletion of a Non-Renewable Resource	<input type="radio"/>	<input type="radio"/>	
Section C (For Projects Outside of ANL)		Yes	No	
29.	Prime, Unique, or Locally Important Farmland	<input type="radio"/>	<input type="radio"/>	
30.	Special Sources of Groundwater (such as sole source aquifer)	<input type="radio"/>	<input type="radio"/>	
31.	Coastal Zones	<input type="radio"/>	<input type="radio"/>	
32.	Areas with Special National Designations (such as National Forests, Parks, or Trails)	<input type="radio"/>	<input type="radio"/>	
33.	Action of a State Agency in a State with NEPA-type Law	<input type="radio"/>	<input type="radio"/>	
34.	Class I Air Quality Control Region	<input type="radio"/>	<input type="radio"/>	

Categorical Exclusion

Other (Use field below to enter other categorical exclusion)

ANL NEPA Reviewer Use Only

- My approval is the final approval necessary
- This form requires additional approval from DOE

To be Completed by DOE/ASO

Section D	Yes	No
Are there any extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal?	<input type="radio"/>	<input checked="" type="radio"/>
Is the project connected to other actions with potentially significant impacts or related to other proposed action with cumulatively significant impacts?	<input type="radio"/>	<input checked="" type="radio"/>
If yes, is a categorical exclusion determination precluded by 40 CFR 1506.1 or 10 CFR 1021.211?	<input type="radio"/>	<input type="radio"/>
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?	<input checked="" type="radio"/>	<input type="radio"/>

If yes, indicate the class or classes of action from Appendix A or B of Subpart D under which the project may be excluded:
 This project may be excluded under the following 10 CFR Part 1021, Subpart D, Appendix B: B3.6 Small-scale research and

development, laboratory operations, 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.

Attachments

File Description:

Comments

Add Approver

Approver Name	Approver Badge	Reason	Delete

Notifications

The approval notification email will be copied to the people listed below.

Badge	Name	Division	Delete

ASO-CX Number

ASO-CX- 390

Comments:

This DOE NEPA ERF Categorical Exclusion approval is tracked as ASO-CX-390.

Approval

<u>Approver</u>	<u>Action</u>	<u>Date Routed</u>	<u>Action Date</u>	<u>Approval Reason / Comments</u>	<u>Approval Type</u>
Woodford, John B.	APPROVED	2021-09-13	2021-09-13 17:22:15.0	Creator :	PRIMARY
Woodford, John B.	APPROVED	2021-09-13	2021-09-13 17:22:15.0	Project Manager :	PRIMARY
Harris, Amy M.	APPROVED	2021-09-13	2021-09-14 06:42:38.0	NEPA Owner Approval for Argonne Environmental Review :	PRIMARY
Harris, Amy M.	APPROVED	2021-09-13	2021-09-14 06:42:38.0	NEPA Owner Approval for Argonne Environmental Review :	PRIMARY
Ptak, Jill S.	APPROVED	2021-09-14	2021-09-17 16:48:38.0	ANL NEPA Reviewer : Loop to be constructed inside a pre-existing exhausted enclosure in Bldg 205. Work applies under pilot scale CX	PRIMARY
Hellman, Karen B.	APPROVED	2021-09-17	2021-10-04 08:56:37.0	ANL-985 Review and Approval :	PRIMARY
Hodge, Devin S. for Dunn, Michael W.	APPROVED	2021-10-04	2021-10-04 13:31:43.0	ANL-985 ANL Deputy COO Review and Approval :	DELEGATE
Joshi, Kaushik N.	APPROVED	2021-10-04	2021-10-05 11:30:05.0	ANL-985 DOE-ASO Review and Approval : This DOE NEPA ERF CX approval is tracked as ASO-CX-390.	PRIMARY
Siebach, Peter Rudolf	APPROVED	2021-10-05	2021-10-13 08:40:06.0	ANL-985 DOE NEPA Compliance Officer Review and Approval :	PRIMARY