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**: Operation of the 20 MeV Electron Linac Accelerator, including upgrade to 50 MeV (CSE060)

(?)**ASO NEPA Tracking No.** ASO-CX-257 (?)**Type of Funding**: Operation funds
B&R Code _____

(?)**Identifying number**: _____ WFO proposal # _____ CRADA proposal # _____
Work Project # _____ ANL accounting # (item 3a in Field Work Proposal) _____
Other (explain) _____

(?)**Project Manager**: George Vandegrift Signature: _____ Date: 12/9/09

(?)**NEPA Owner**: Roberta Riel Signature: Roberta Riel Date: 12/9/09

ANL NEPA Reviewer: *M. A. Kamiya* Signature: M. A. Kamiya Date: 12/9/2009

I. (?)**Description of Proposed Action:** This review covers the operation and maintenance of the 20-MeV linac electron accelerator as it is currently authorized. In addition, the review will cover a planned upgrade program to increase the power to 50 MeV. The accelerator will be operated within approved and authorized limits as detailed in the governing Safety Assessment Document (SAD), Work Control Permit, Radioactive Work Permit or other applicable documents.

II. (?)**Description of Affected Environment:** The 20 MeV Linac electron accelerator is an existing facility that is used by CSE division to study radiation induced effects in solid, liquid and gaseous samples. An upgrade in energy up to 50 MeV is being planned, and is scheduled for completion during the second quarter of FY10. The Linac accelerator facility is located in Building 211, room D-076 and utilizes a closed loop cooling water system and a one pass air ventilation system. The energy of the generating electrons is high enough to induce radioactivity in accelerator components (beam pipes, magnets, and beam stops) but direct interaction of the high energy electrons with air does not effectively activate the air due to the small cross section. Activation of the air is possible only when high energy electrons strike a specific target and high energy x-rays are produced. Calculations of the radioactivity produced during the activation of air are detailed below.

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 ____

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

   Per B. Micklach (PHY) The activity for three cases A: maximum beam energy and beam current per present SAD, B: Conditions that are planned to use for thermal load test of the Mo target and C: for planned upgrade of accelerator that will be completed in one year from now and will be go through NEPA evaluation later.

Table 1. Operational parameters of the accelerator

		case	
	A	B	C
beam energy (MeV)	20	15	35
beam current (uA)	200	2000	700
accelerator power (kW)	4	30	24.5
assumed path length of brems in air (m)	1	1	1
target room volume (liters)	300000	300000	300000
run time (hr)	2000	2000	2000
wait time (min)	15	15	15
occupancy time (min)	5	5	5

Release (Table 2)is calculated based on room inventory (concentration) during operation plus exhaust of air after run stops. The run is this case is defined as 2000 hrs, the nominal amount of operating time in one year.

Table 2. Radioactive gases release at three different scenarios mentioned above. We are currently limited per linac Safety Assessment Document to case A. Activities are calculated for nominal amount of operation time in a calendar year. Realistic estimate of experimental (irradiation time) per year is 100 times less. The activity will be proportional to the irradiation time.

		activity released due to one run (Ci)		
nuclide	half life (s)	A	B	C
He-3	3.89e+08			4.40E-05
Be-7	4.61e+06			7.97E-04
C-11	1223.1	7.56E-03		4.63E-02
	1223.1			2.78E+01
N-13	597.9	4.02E+02	3.01E+03	2.46E+03
O-15	122.24	1.36E+02		8.33E+02
N-16	7.13			5.82E-01
Cl-38	2234.4			3.15E-01
Cl-39	3336	2.33E-01	1.74E+00	1.42E+00

Radiological air emissions require annual submission of data to the Environmental Protection Manager for submission to the US EPA for their annual NESHAP report.

3. (?)Noise Yes ____ No X

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

Small amount of chemicals are used in experiments (< 100 ml). Those samples are usually prepared elsewhere and are returned to the owner after irradiation. Small amount of common solvents are used for cleaning of vacuum equipment and stored on facility in flammable liquid cabinet.

5. (?)Pesticide Use Yes ____ No X

6. (?) Polychlorinated Biphenyls (PCBs) Yes ____ No X

7. (?) Biohazards Yes ____ No X

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

9. (?)Waste Management

a) Construction or Demolition Waste Yes ___ No X
b) Hazardous Waste Yes ___ No X
c) Radioactive Mixed Waste Yes ___ No X
d) Radioactive Waste Yes ___ No X
e) PCB or Asbestos Waste Yes ___ No X
f) Biological Waste Yes ___ No X
g) No Path to Disposal Waste Yes ___ No X
h) Nano-material Waste (is any waste generated? If yes add text) Yes ___ No X

10. (?)Radiation Yes X No ___

20MeV linac accelerator can produce ionizing radiation (beta, and gamma rays) at the energy up to 20 MeV. (~~I would put something her on how the radiation is controlled, shielding, limited access etc~~). Radiation is controlled thru the SAD and other relevant Work and Radiation control documentation

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

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

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 ___ No X

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

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

19. (?)Wetlands Yes ___ No ___

20. (?)Floodplain Yes ___ No ___

21. (?)Landscaping Yes ___ No ___

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

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

24. (?)Archaeological Resources Yes ___ No ___

25. (?)Underground Injection Yes ___ No ___

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

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

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

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. (?)Subpart 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.3.10. Operation/maintenance of particle accelerators w/ primary beam energy of less than 100 MeV.

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: 12/15/09

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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: 12/16/2009

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:

CH GLD: _____

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: _____

Ronald J. Lutha
Site Manager