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. (?)		(?) Type of Funding	: Operation funds
		B&R Code	-
(?)Identifying number: W	/FO proposal #	CRADA p	roposal #
Work Project # A	NL accounting # (iter	n 3a in Field Work Pr	oposal)
Other (explain)			
(?)Project Manager: Allen Bakel	_Signature://_	J. Bacht	Date: 3/21/11
(?)NEPA Owner: Roberta Riel	_ Signature: Roly	An Rief_	Date: <u>3/21/2011</u>
ANL NEPA Reviewer: <u>M. A. Kamiya</u>	Signature: C	Kunge	Date: 3 21 / 20

I. <u>(?)Description of Proposed Action:</u> 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, 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 FY11. 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. <u>(?)Potential Environmental Effects:</u> (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 <u>X</u> No _____ Yes X No

2. (?)Air Pollutant Emissions

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.

		case	
	A	В	С
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)	1000	1000	1000
wait time (min)	15	15	15
occupancy time (min)	5	5	5

Table 1. Operational parameters of the accelerator

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)	Α	В	с
	2 900+09			2 205 05
Re-7	4 61e+06			2.20E-05
C-11	1223.1	3.78E-03		1.39E+01
N-13	597.9	2.01E+02	1.50E+03	1.23E+03
0-15	122.24	6.8E+01		4.16E+02
N-16	7.13			2.91E-1
CI-38	2234.4			1.57E-01
CI-39	3336	1.17E-01	8.70E-01	7.10E-01
Total		2.69E+02	1.50E+03	1.16E+03

Radiological air emissions require annual submission of data to the Environmental Protection Manager for submission to the US EPA for their annual NESHAP report. The operations of the Linac will be limited to 1000 hours to ensure that the mandatory regulatory monitoring requirements are not needed.

- 3. (?)Noise
- 4. (?)Chemical Storage/Use

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.

Yes ____ No <u>X</u>

Yes X No

5.	(?)Pesticide Use	Yes	No <u>X</u>
6.	(?) Polychlorinated Biphenyls (PCBs)	Yes	No <u>x</u>
7.	(?) Biohazards	Yes	No <u>X</u>
8.	(?)Liquid Effluent (wastewater)	Yes	No <u>X</u>
9.	(?)Waste Management		
	 a) Construction or Demolition Waste b) Hazardous Waste c) Radioactive Mixed Waste d) Radioactive Waste 	Yes Yes Yes	No <u>X</u> No <u>X</u> No <u>X</u>
	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 <u>X</u>	 No
	20MeV linac accelerator can produce ionizing radiation (beta, and gamma energy up to 20 MeV.	rays) at ti	he
11	. (?)Threatened Violation of ES&H Regulations or Permit Requirements	Yes	No <u>X</u>
12	. (?)New or Modified Federal or State Permits	Yes <u>x</u>	No
	The Lines coordinates has been in new continuous coordination since 1071.		11 now
	be categorized as a radionuclide emission unit, a construction permit is requilinois Environmental Protection Agency. The permit application has been will be approved within 90 days of receipt.	juired from n submitt	n the ed and
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13 14	 The Linac accelerator has been in hon-continuous operation since 1971. S be categorized as a radionuclide emission unit, a construction permit is requilinois Environmental Protection Agency. The permit application has been will be approved within 90 days of receipt. (?)Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste (?)Public Controversy 	Yes	n the ed and No <u>x</u>
13 14 15	 The Linac accelerator has been in hon-continuous operation since 1971. S be categorized as a radionuclide emission unit, a construction permit is requilinois Environmental Protection Agency. The permit application has been will be approved within 90 days of receipt. (?)Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste (?)Public Controversy (?)Historic Structures and Objects 	Yes Yes	No <u>x</u> No <u>x</u> No <u>x</u>
13 14 15 16	 The Linac accelerator has been in hon-continuous operation since 1971. S be categorized as a radionuclide emission unit, a construction permit is requilinois Environmental Protection Agency. The permit application has been will be approved within 90 days of receipt. (?)Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste (?)Public Controversy (?)Historic Structures and Objects (?)Disturbance of Pre-existing Contamination 	Yes Yes Yes Yes	No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u>
13 14 15 16 17	 The Linac accelerator has been in hon-continuous operation since 1971. S be categorized as a radionuclide emission unit, a construction permit is requilinois Environmental Protection Agency. The permit application has been will be approved within 90 days of receipt. (?)Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste (?)Public Controversy (?)Historic Structures and Objects (?)Disturbance of Pre-existing Contamination (?)Energy Efficiency, Resource Conserving, and Sustainable Design Features 	Yes Yes Yes Yes Yes Yes	No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u>
13 14 15 16 17 B.	 The Linac accelerator has been in non-continuous operation since 1971. S be categorized as a radionuclide emission unit, a construction permit is requilinois Environmental Protection Agency. The permit application has been will be approved within 90 days of receipt. (?)Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste (?)Public Controversy (?)Historic Structures and Objects (?)Energy Efficiency, Resource Conserving, and Sustainable Design Features For projects that will occur outdoors, complete Section B as well as Section B as	Yes Yes Yes Yes Yes Yes Yes	No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u>
13 14 15 16 17 B. 18	 The Linac accelerator has been in non-continuous operation since 1971. S be categorized as a radionuclide emission unit, a construction permit is req Illinois Environmental Protection Agency. The permit application has bee will be approved within 90 days of receipt. (?)Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste (?)Public Controversy (?)Public Controversy (?)Historic Structures and Objects (?)Energy Efficiency, Resource Conserving, and Sustainable Design Features For projects that will occur outdoors, complete Section B as well as Section Protected Species 	Yes Yes Yes Yes Yes Yes Yes	No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u>
13 14 15 16 17 B. 18 19	 The Linac accelerator has been in non-continuous operation since 1971. S be categorized as a radionuclide emission unit, a construction permit is req Illinois Environmental Protection Agency. The permit application has bee will be approved within 90 days of receipt. (?)Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste (?)Public Controversy (?)Historic Structures and Objects (?)Disturbance of Pre-existing Contamination (?)Energy Efficiency, Resource Conserving, and Sustainable Design Features For projects that will occur outdoors, complete Section B as well as Se (?)Threatened or Endangered Species, Critical Habitats, and/or other Protected Species (?)Wetlands 	Yes Yes Yes Yes Yes Yes Yes Yes Yes	No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u>
13 14 15 16 17 B. 18 19 20	 The Emac accelerator has been in non-continuous operation since 1971. S be categorized as a radionuclide emission unit, a construction permit is req Illinois Environmental Protection Agency. The permit application has bee will be approved within 90 days of receipt. (?)Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste (?)Public Controversy (?)Historic Structures and Objects (?)Energy Efficiency, Resource Conserving, and Sustainable Design Features For projects that will occur outdoors, complete Section B as well as Section Protected Species (?)Wetlands (?)Floodplain 	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u> No <u>x</u>

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21. (?)Landscaping	Ye\$	No
22. (?)Navigable Air Space	Ye\$	No
23. (?)Clearing or Excavation	Yes	No
24. (?)Archaeological Resources	Yes	No
25. (?)Underground Injection	Yes	No
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.
29. (?)Prime, Unique, or Locally Important Farmland	Yes	No
30. (?)Special Sources of Groundwater (such as sole source aquifer)	Yes	No
31. (?)Coastal Zones	Үеь	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
(?)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
is the project connected to other actions with potentially significant impacts or related to other proposed action with cumulatively significant impacts?	Yes	No X
f 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 Subpar project may be excluded. <u>Appendix B, B.3.10 Simple</u> Operation/decommissioning of particle acce including electron beam accelerators, pr energy less than approximately 100 MeV.	t D under v <u>t i'ng /cc</u> le ra tc imary	which the p <u>nstruc</u> t; prs, beam

IV.

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: Kaushik N. Joshi	
Signature: MMJDSh.	Date: 3-21-11
ASO NCO Approval of CX Determination: The preceding pages are a record of documentation that an act further NEPA review under DOE NEPA Regulation 10 CFR P proposed action meets the requirements for the Categorical Exclu- Signature: Peter R. Siebach Acting Argonne Site Office NCO	tion may be categorically excluded from art 1021.400. I have determined that the usion identified above. Date: $3/2/11$
ASO NCO EA or EIS Recommendation:	
Class of Action:	
Signature: Peter R. Siebach Acting Argonne Site Office NCO	Date:
Concurrence with EA or EIS Recommendation:	
CH GLD:	
Signature:	Date:
ASO Manager Approval of EA or EIS Recommendation:	
AnEAEIS shall be prepared for the proposed	and
shall serve as the document manager.	
Signature: Dr. Joanna M .Livengood Manager	Date: