Environmental Review Form for Argonne National Laboratory

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Created By:	Barkalow, Thomas

Creator

Badge:	**44669**	Name:	**Barkalow, Thomas**
Cost Center:	**272**	Division:	**PSC**
Job Title:	**ALD ESH/QA Coordinator**	Employee Type:	**Regular Full-Time Exempt**
Building:	**401**	Lab Extension:	**2-9243**

General Information

Project/Activity Title: APS Upgrade Project - MBA Scope - Revision 1

ASO NEPA Tracking No.: ASO-CX-313 Type of Funding: DOE MIE

B & R Code: Identifying Number: Code PSC1501

SPP Proposal Number: CRADA Proposal Number:

Work Project Number: ANL Accounting Number: (Item 3a in Field Work Proposal)

Other (explain): DOE MIE Project

List appropriate NEPA Owners:

Division: PSC NEPA Owner:

Cost Code

Task: 7101200 Center: 133 Project: Activity:

Description of Proposed Action

The Advanced Photon Source (APS) is a major national user facility providing high-brilliance x-ray beams for users from Argonne National Laboratory (ANL), other national laboratories, academic institutions, governmental bodies, and industrial firms. Synchrotron radiation emitted by circulating electron beams is used as the source of x-rays for probing the structure of matter and for studying various physical and chemical processes. The APS presently uses a stored circulating electron beam current of 102 mA at an electron energy level of 7.0 GeV (representing a stored energy level of 2630 J) during normal operations. The highest electron energy level achievable is 7.7 GeV. The facility is authorized to operate with a safety limit for stored energy level of 9280 J (representing a maximum stored electron beam current of 327 mA at 7.7 GeV or 360 mA at 7.0 GeV). The proposed action includes activities involved with removal of the existing storage ring and associated equipment followed by installation of the new storage ring and associated equipment. An existing NEPA categorical exclusion, ASO-CX-313 has been issued by the Argonne Site Office to cover this portion of the APS Upgrade project. The appropriate information from that CX is repeated in this revision. This revision addresses further scope that has now been defined for the proposed action. The further scope includes activities associated with building new, rebuilding existing, and upgrading a suite of 8 beamlines designed for best-in-class performance; improving all remaining beamlines to make them ready to utilize the x-ray beams resulting from the MBA storage ring; installing new or upgrading existing front ends to provide a common design for maximum flexibility of use; and installing new insertion devices on all ID beamlines, including superconducting undulators for selected beamlines. Two of the eight beamlines will be long beamlines installed at 19 ID and 20 ID which will penetrate the outer wall of Building 400 and necessitate building enclosed instrument stations in the Building 400 infield in the southwest quadrant between Buildings 446 and 440. The designs for the beamlines, front ends, and any associated insertion devices are being developed. Additional description is provided in the attached document.

Description of Affected Environment

The baseline description of the affected environment is provided in the Environmental Assessment for Enhanced Operations of the Advanced Photon Source at Argonne National Laboratory-East, Argonne, Illinois, DOE/EA-1455, June 2003. The APS site areas affected are expected to be inside Building 400, various adjoining Laboratory/Office Modules (LOMs), and outdoors in the APS site's southwest quadrant. The southwest quadrant was extensively modified during the construction of the Advanced Protein Characterization Facility, Building 446, which was addressed in ASO-CX-284. The area between Buildings 446 and 440 contains parking lots, areas graded as part of Building 446 construction and consequently replanted with native prairie grass and plant species, and remnants of old farm field habitat which presently is not mowed and is dominated by non-native grasses and plants

with infrequent occurrences of native prairie grass and plant species. The affected environment described in ASO-CX-286 (which covered the original scope of the APS Upgrade Project) has been modified since that CX was issued in May 2011, but those modifications have been addressed in ASO-CX-284 that was issued for the construction of Building 446.. A former small wetland, previously identified as Wetland C, is located north and northwest of the APCF site. This location now lacks wetland hydrology, and the vegetation community is composed primarily of non-native species, including a number of upland species.The Enhanced Operations EA issued by DOE in June 2003 stated that Wetland C had been lost. The Corps of Engineers (COE) has since accepted Wetland R as a viable wetland replacement for the small wetlands destroyed during construction. The COE also has concluded that Wetland C is isolated and therefore non-jurisdictional so mitigation of Wetland C is no longer needed. The COE further confirmed that DuPage County does not exercise jurisdiction over wetlands at federal sites. Since Wetland C has not been viable for over 20 years and is considered lost, no wetland area would be affected by the APS Upgrade project. The NEPA Categorical Exclusion ASO-CX-284 issued in 2011 addressed the original scope of the APS Upgrade Project which included construction of a long beamline on 20 ID, accepted that no wetland area would be affected by that long beamline. The APS infield area covered by that CX is the same as to be used in the current project scope being addressed in this document. Stormwater runoff will be protected during long beamline external infrastructure construction activities by implementing storm water and erosion control measures before construction begins and by properly maintaining the measures during construction. Subsequent to construction, completed site grading and stormwater management system will ensure these areas are not negatively impacted. The western edge of the area between Buildings 446 and 440 next to Kearney Road contains an underground pipe that empties into a drainage swale about midway to the Bluff Road intersection. The pipe is from the discharge of a pump in a collection basin that receives runoff from the Building 440 parking lot. The water pumped out of this basin exits the pipe and follows the drainage swale and a culvert under Bluff Road and eventually empties offsite west from Wetland R. In general the southwest quadrant drains towards the southern edge of the Argonne site that is west of Wetland R.

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	◉	○	Note: Minor soil excavation is anticipated for construction of the long beamlines external infrastructures. Any soil excavated will be reused as fill or for landscaping following construction completion. The Facilities management and Services Division (FMS) will determine as needed whether other excavated soil that may be stored on site could be reused in the fill. An approved soil erosion plan will be used as for other construction activities on site.
2.	Air Pollutant Emissions	◉	○	A low level of air pollutant emissions may result from use of vehicles and mobile lift equipment during storage ring removal, assembly and installation as well as during construction of the long beamlines. No new types of air pollutant emissions will result from upgrade operation. Emissions of airborne radionuclides could lead to exposure of the general public outside of the Argonne site. Radionuclides are produced at APS as a side effect of accelerator operations (i.e., the purpose of APS is not to produce radionuclides). The main source of airborne radionuclides at APS are the short-lived isotopes N-13 and O-15 and C-11. These emissions are addressed in the existing US EPA Clean Air Act Permit Program (CAAPP) Permit ID: 95090195 and are included in the annual NESHAPS report. The emission quantities are calculated based on the number of operating hours, each accelerator system's beam power level, and the air exhaust from the various accelerator enclosure ventilation systems to the outside atmosphere. Emissions are calculated for three separate areas: (1) LINAC/PAR operations in Buildings 411 and 412, (2) booster synchrotron operation in Building 415, and (3) storage ring operation in Building 400. The amount of air activation products produced by storage ring operation (~0.03 Ci) is several orders of magnitude lower than the quantities produced by operation of the LINAC/PAR (~14 Ci) and booster synchrotron (~ 16 Ci). Any increase in these values due to the upgrade is not expected to be significant. An increase of even an order of magnitude would have a negligible impact on dose to the general public. An outcome of the APS Upgrade will be to operate the storage ring at a stored electron beam power level 1.7x higher than with the existing storage ring. The quantity of air activation products is directly linear to the power level so the storage ring will produce about 1.7x greater air activation products than at present. This linear extrapolation assumes losses similar to the present storage ring. Since the storage ring contributes an insignificant amount (0.1% or less) to

					the total quantity of APS activated air emissions, an increase of 1.7x is not a concern. The operation of the LINAC/PAR and booster synchrotron after the upgrade will remain within the present operating envelope.
3.	Noise		◉	○	Argonne requirements related to hearing protection will be followed should removal, assembly or installation activities result in noise levels above 85 decibels. Sustaining noise above this level for appreciable lengths of time is not anticipated during normal removal, assembly or installation activities.
4.	Chemical/Oil Storage/Use		◉	○	Various cleaning and lubricating compounds will be present during removal, assembly and installation activities. Any oil containers greater than or equal to 55 gallons will be kept within a secondary containment, such as a spill pallet, even if indoors. Chemicals will also be present during beamline operation. Safety Data Sheets are required to be readily available during assembly, removal and installation when chemicals are present. The Enhanced Operations EA did not provide information on specific chemicals that may be present during beamline operations. Instead that document took credit for use, where needed, of engineered ventilation means in beamline spaces to minimize chemical exposure and the use of an experiment safety review process to identify chemical hazards and to specify necessary safety measures in experiment designs and safe handling procedures to be followed during the experiments. Some or all of these same means will be used during and following completion of APS beamline upgrades. The upgrade will not result in changes to oil usage or storage at the APS.
5.	Pesticide Use		○	◉	
6.	**Toxic Substances Control Act (TSCA) Substances**				
	6a.	Polychlorinated Biphenyls (PCBs)	○	◉	
	6b.	Asbestos or Asbestos Containing Materials	○	◉	
	6c.	Other TSCA Regulated Substances	○	◉	
	6d.	Import or Export of Chemical Substances	○	◉	
7.	Biohazards		○	◉	
8.	Effluent/Wastewater (If yes, see question #12 and contact Peter Lynch (FMS-SEP) at 2-4582 or lynch@anl.gov)		◉	○	The proposed long beamlines infrastructure to be built exterior to Building 400 most likely will exceed an acre in disturbed ground. In accordance with requirements in the Argonne site SWPPP, a project specific Stormwater Pollution Prevention Plan (SWPPP) will be prepared and submitted to the Illinois EPA for review/approval prior to outdoor construction activities beginning on the wide field imaging beamline. New floor drains to the Argonne sewer system may be installed in the long beamline end station infrastructure added as part of the upgrade and would be added in accordance with APS standard construction practice. An existing drainage swale along Kearney Road south of Building 440 is used to route to offsite drainage pumped water from the Building 440 parking lot sump. This drainage swale will remain and will be protected during construction of the proposed long beamlines. New parking areas constructed for the long beamlines end stations infrastructure will connect to existing parking areas. According to the Argonne water pollution control subject matter expert, the additions to the Argonne sewer system and use of the existing drainage swale will not require a modification to the current Argonne NPDES permit. All wastewater affluent drainage will be to the south of the APS site.
9.	**Waste Management**				
	9a.	Construction or Demolition Waste	◉	○	The removal activities for the existing APS storage ring and associated electronics and cabling will generate a total of 1900 tons of waste material, most of which will consist of the storage ring magnets and steel support structures. Small quantities of typical construction related wastes may also be generated. See c) and d) below for handling of the various waste types. Typical

					construction related wastes may be generated by construction and modification of beamlines, but not in any significant quantities. This includes the construction of the long beamlines infrastructure that will consist of single floor girder and panel structures on a concrete base.
	9b.	Hazardous Waste	◉	○	Removal of existing storage ring or beamline components may generate a relatively small quantity of lead contaminated waste. Any such waste will be handled in accordance with Argonne and APS hazardous waste requirements. Use of the upgraded beamlines may result in small quantities of hazardous chemical wastes, but these are not expected to be substantially different than existing quantities.
	9c.	Radioactive Mixed Waste	◉	○	Current APS operations occasionally produce a very small quantity of radioactive mixed waste. Operations following the upgrade could similarly create a very small quantity of radioactive mixed waste. Existing Argonne and APS procedures will be followed if radioactive mixed waste is created.
	9d.	Radioactive Waste	◉	○	Items to be removed from the storage ring tunnel will consist mainly of support girders, magnets, vacuum chamber components, and front end equipment. All items will be initially surveyed in the tunnel before removal. Regardless of radiological survey readings, all metallic items removed from the tunnel will be handled as encumbered under the Richardson metals moratorium. This will constitute the vast majority of the removed items. Argonne recently obtained DOE review and approval of radiological survey methods in accordance with both DOE Directive O 458.1, Radiation Protection of the Public and the Environment, and recently released DOE Standard DOE-STD-6004-2016 Clearance and Release of Personal Property from Accelerator Facilities. Argonne is preparing a site plan for use of the pre-authorized release limits from O 458.1 and DOE-STD-6004-2016. Argonne recently used these documents as a basis for the recycling of 29 tons of metallic components that had been removed from the storage ring enclosure since 2001 and stored in the Argonne 800 area in several intermodal containers. The actions taken to recycle those items are similar to those to be used for items removed from the storage ring during project execution. The project will cover removing the items, conducting preliminary surveys, and then ensuring the items are placed into a selected storage area pending further radiological surveys and processing for recycling or disposal under Argonne's site plan. It is estimated that about 90% of the removed items could be available for recycle or reuse. A small percentage of the waste could be contaminated or activated and will be handled according to Argonne and APS procedures.
	9e.	Asbestos Waste	○	◉	
	9f.	Biological Waste	◉	○	No new biological facilities will be added as part of the upgrade, but biological samples will continue to be used in upgraded beamline experiments. The amount of biological waste generated is not expected to be substantially different in quantity or type than for present biological experiments. The hazards of generated biological waste and its handling along with any necessary mitigation will be evaluated and provided by the experiment safety review process prior to the samples being used.
	9g.	No Path to Disposal Waste	○	◉	
	9h.	Nano-material Waste	◉	○	There is a small quantity of nano-material waste presently being generated as a result of experiments conducted on nano-material samples. The amount of nano-material waste generated by experiments conducted following beamline upgrades is not expected to be substantially different in quantity than for the present experiments. The hazards of generated nano-material waste and its handling along with any necessary mitigation will be evaluated and provided by the experiment safety review process prior to the samples being used.
					Ionizing radiation could result in external exposure of personnel, users, and members of the general public. Exposure due to release of airborne radionuclides in the form of air activation products has already been addressed in responding to Item III.A.2 in this ERF. Prompt radiation hazards arising from the loss of beam in targets, beam stops, septum magnets, and accelerator components lead to the production of radiation fields during injector operations. These radiation fields consist mainly of bremsstrahlung (x-rays), gamma rays, and neutrons. Interactions with these radiations leads to activation of accelerator components, which could also represent potential external exposure hazards. As the stored beam circulates in the storage ring, a small fraction of the beam is lost due to collisions with gas molecules, interactions among beam particles, and orbital excursions, which also produce radiation. In addition, the primary purpose of the APS is to produce high-quality synchrotron radiation (x-rays). The accelerator tunnel shielding for the radiation produced by normal operations of the accelerator system was designed based on operations that produce, accelerate, and store a 7.7 GeV electron beam using an injected beam-power level of 308 W with a stored electron beam energy of 9280 J. The beamline and experiment station shielding was designed for the synchrotron radiation produced by either a bending magnet or an insertion device. For synchrotron-radiation (x-rays)

10.	Radiation	◉	○	calculations, storage ring energy of 7.5 GeV and storage ring current of 200 mA have been assumed in all cases. These parameters were chosen for the simulation of the synchrotron radiation because they proved to be a worse case than the 7.0-GeV, 300-mA case. These design parameter values for accelerator tunnels, beamlines, and experiment stations exceed the maximum operating parameters of 6.0 GeV and 200 mA, which will result from the APS-U project. Thus it is anticipated that the presently installed shielding will continue to be within design parameters, with minor changes in locally shielded areas within the tunnel. The Enhanced Operations EA provided radiation exposure information based on information from existing Safety Assessment Document (SAD) analyses (which were based on the analyses used for shielding design). The SAD beamline analysis was based on the use of the Monte Carlo radiation transport computer code EGS4 that calculates a gamma radiation dose. Given the change in the beam energy, brilliance and the use of swap-out versus top-up, radiation safety calculations are being performed using a different computer code to determine loss modes (normal and accident conditions), to verify that the present shielding is sufficient and to determine what localized shielding is needed. These calculations will also be used to update the estimated air activation levels and other radiation calculations. Regardless of the new calculation's results, the actual radiation conditions will be determined by radiological surveys conducted as part of accelerator and beamline commissioning following completion of accelerator and beamline modifications within the APS-U scope and appropriate action taken as a result of these measurements.
11.	Threatened Violation of ES&H Regulations or Permit Requirement	○	◉	
12.	New or Modified Federal or State Permits	○	◉	
13.	Siting, Construction, or Major Modification of Facility to Recover, Treat, Store, or Dispose of Waste	○	◉	
14.	Public Controversy	○	◉	
15.	Historic Structures and Objects	○	◉	The research conducted at APS using the storage ring being replaced may later be determined to be of historic significance. Documentation of the storage ring will be maintained and consideration given to retaining a sample of the storage ring (such as the last bending magnet installed as it has signatures of numerous workers and managers).
16.	Disturbance of Pre-existing Contamination	○	◉	
17.	Energy Efficiency, Resource Conserving, and Sustainable Design Features	◉	○	Electric energy usage for the 400 Area in FY2014, including Buildings 440 and 450, during normal operations was a daily average of 16 to 17 megawatt hours based on data collected from existing electric meters. The highest daily average historical usage during normal operations was 23.5 megawatt hours. Usage decreases during maintenance periods to a daily average of 8 megawatt hours. These values compare to the anticipated daily megawatt hour usage of 25 that is stated in the Enhanced Operations EA with Building 440 adding 3.5 MW hour usage for a total of 28.5 MW hour usage for the 400 Area. The energy usage for this same area during and after the upgrade will not increase and therefore electric energy usage will not exceed the value given in the Enhanced Operations EA. The external infrastructure to be built for the long beamlines will not be significant structures, but improved energy efficiency measures will be incorporated into the designs in accordance with the Argonne Site Sustainability Plan. Areas addressed in the plan include lighting, heating, cooling, power metering and energy saving building construction.
Section B (For Projects that Occur Outdoors)		**Yes**	**No**	
18.	Threatened or Endangered Species, Critical Habitats, and/or other Protected Species	○	◉	

19.	Wetlands	○	◉	A former small wetland, previously identified as Wetland C, is located north and northwest of the APCF site. This location now lacks wetland hydrology, and the vegetation community is composed primarily of non-native species, including a number of upland species.The Enhanced Operations EA issued by DOE in June 2003 stated that Wetland C had been lost. The Corps of Engineers (COE) has since accepted Wetland R as a viable wetland replacement for the small wetlands destroyed during construction. The COE also has concluded that Wetland C is isolated and therefore non-jurisdictional so mitigation of Wetland C is no longer needed. The COE further confirmed that DuPage County does not exercise jurisdiction over wetlands at federal sites. Since Wetland C has not been viable for over 20 years and is considered lost, no wetland area would be affected by the APS Upgrade project. The NEPA Categorical Exclusion ASO-CX-284 issued in 2011 addressed the original scope of the APS Upgrade Project which included construction of a long beamline on 20 ID, accepted that no wetland area would be affected by that long beamline. The APS infield area covered by that CX is the same as to be used in the current project scope being addressed in this document.
20.	Floodplain	○	◉	
21.	Landscaping	◉	○	Limited landscaping might be performed around the base slabs for the long beamlines enclosed instrument stations. This will occur if the soil around the base slab needs to be graded and sloped to restore existing drainage paths, and planted with existing native plant species.
22.	Navigable Air Space	○	◉	
23.	Clearing or Excavation	◉	○	Construction of the long beamlines external infrastructure may entail the need for excavated soil to be reused in fill. It is anticipated that mostly fill soil will be added and that little actual excavation will be necessary. Existing drainage paths will be restored as needed through grading of the fill following construction completion. A Sedimentation and Erosion Control (SEC) Plan will be prepared prior to any outdoor construction activities.
24.	Archaeological Resources	○	◉	
25.	Underground Injection	○	◉	
26.	Underground Storage Tanks	○	◉	
27.	Public Utilities or Services	◉	○	Connections will be installed to currently existing services for telephone, sewer, and electricity to the long beamlines external instrument stations. No new services or utilities will be added.
28.	Depletion of a Non-Renewable Resource	○	◉	
	Section C (For Projects Outside of ANL)	**Yes**	**No**	
29.	Prime, Unique, or Locally Important Farmland	○	◉	
30.	Special Sources of Groundwater (such as sole source aquifer)	○	◉	
31.	Coastal Zones	○	◉	
32.	Areas with Special National Designations (such as National Forests, Parks, or Trails)	○	◉	
33.	Action of a State Agency in a State with NEPA-type Law	○	◉	
34.	Class I Air Quality Control Region	○	◉	

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?	○	◉
Is the project connected to other actions with potentially significant impacts or related to other proposed action with cumulatively significant impacts?	○	◉
If yes, is a categorical exclusion determination precluded by 40 CFR 1506.1 or 10 CFR 1021.211?	○	○
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?	◉	○
If yes, indicate the class or classes of action from Appendix A or B of Subpart D under which the project may be excluded: DOE approves this ERF under the following categories of 10 CFR, Part 1021, Subpart D, Appendix B: B1.23 Demolition and disposal of buildings, and B1.31 Installation or relocation of machinery and equipment.		
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: Expanded description of the proposed action View Attachment

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Comments

Add Approver

Approver Name	Approver Badge	Reason	Delete
Kerby, James S.	225890	Project Manager	
Henderson, Stuart D.	222085	Project Director	
Ptak, Jill S.	220875	NEPA Reviwer	

Notifications

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

Badge	Name	Division	Delete
44669	Barkalow, Thomas	PSC	
225890	Kerby, James S.	PSC	
222085	Henderson, Stuart D.	PSC	
220875	Ptak, Jill S.	FMS	

ASO-CX Number

ASO-CX- 337

Comments:

DOE ASO and DOE Chicago track this ERF approval as ASO-CX-337.

Approval

Approver	Action	Date Routed	Action Date	Approval Reason / Comments	Approval Type

Barkalow, Thomas	APPROVED	2017-02-02	2017-02-02 13:58:35.0	Creator :	PRIMARY
Barkalow, Thomas	APPROVED	2017-02-02	2017-02-02 13:58:35.0	Allows access to the form :	PRIMARY
Barkalow, Thomas	APPROVED	2017-02-02	2017-02-02 13:58:35.0	Allows access to the form :	PRIMARY
Barkalow, Thomas	APPROVED	2017-02-02	2017-02-02 13:58:35.0	Project Manager :	PRIMARY
Kerby, James S.	APPROVED	2017-02-02	2017-02-08 08:55:16.0	Project Manager : **very small typo, there is an extra "." after "...Building 446." in the 2nd paragraph of the affected environment description.**	PRIMARY
Henderson, Stuart D.	APPROVED	2017-02-02	2017-02-02 19:40:01.0	Project Director :	PRIMARY
Ptak, Jill S.	APPROVED	2017-02-02	2017-02-03 15:20:35.0	NEPA Reviwer :	PRIMARY
Barkalow, Thomas	APPROVED	2017-02-02	2017-02-02 13:58:35.0	NEPA Owner Approval for Argonne Environmental Review :	PRIMARY
Ptak, Jill S.	APPROVED	2017-02-08	2017-02-08 11:12:41.0	ANL NEPA Reviewer :	PRIMARY
Hellman, Karen B.	APPROVED	2017-02-08	2017-02-08 11:40:50.0	ANL-985 Review and Approval :	PRIMARY
Stine, Gail Y.	APPROVED	2017-02-08	2017-02-13 12:02:00.0	ANL-985 Review and Approval :	PRIMARY
Lee, Alice J. for Kearns, Paul K.	APPROVED	2017-02-13	2017-02-13 12:07:19.0	ANL-985 ANL COO Review and Approval :	DELEGATE
Joshi, Kaushik N.	APPROVED	2017-02-13	2017-03-02 11:56:11.0	ANL-985 DOE-ASO Review and Approval : **ASO-CX-337**	PRIMARY
Siebach, Peter R.	APPROVED	2017-03-02	2017-03-07 14:14:43.0	ANL-985 DOE NEPA Compliance Officer Review and Approval :	PRIMARY