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June 30, 2017

Dr. Peter Lee  
Decommissioning Branch  
Nuclear Regulatory Commission, Region III  
2443 Warrenville Road, Suite 210  
Lisle, IL 60532

Re: Addendum to Remediation Work Plan for Radioactive Materials License 34-32780-01,  
Cardinal Health PET Manufacturing Services, St. Louis, MO

Dr. Lee,

Cardinal Health, 414, LLC (Nuclear Pharmacy and PET Manufacturing Services, hereafter Cardinal Health) hereby submits to the Nuclear Regulatory Commission the attached addendum to the Remediation Work Plan for the above licensed facility in St. Louis, Missouri. The original plan was dated September 26, 2016.

This addendum addresses the use of wire saws to cut some sections of concrete from the cyclotron vault. This equipment requires water to help cool and lubricate the saws, and the addendum also discusses the processes involved in the collecting, sampling, and disposal of this waste water and associated slurry.

If you have any questions regarding this letter, please contact me at 614.553.4555.

Sincerely,

Evan T. Western, CHP  
Manager, Health Physics  
Quality and Regulatory  
Nuclear Pharmacy Services

/ew

cc: Tim Pratt, Ameriphysics  
License File 5809 (3)

Attachment: Addendum to Remediation Work Plan

# **ATTACHMENT A**

## **Addendum to Remediation Work Plan**

# Addendum to Remediation Work Plan

1110-PP-002 Rev. 0

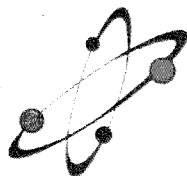
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**Prepared for:**

Cardinal Health PET Cyclotron Facility  
St. Louis, MO

**June 29, 2017**

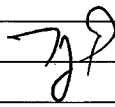
**Prepared by:**



**AMERIPHYSICS**

9111 Cross Park Drive, Suite D200  
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## RECORD OF REVISIONS

Change Number	Date	Description of Change	Approval
0	6/29/17	Initial Distribution	

## APPROVALS

Prepared By

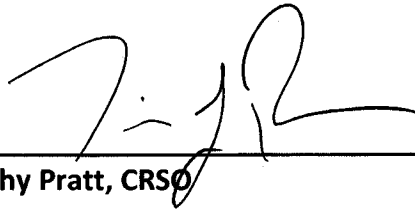


Tom Hansen III, Project Manager

6/29/17

Date

Reviewed By



Timothy Pratt, CRSO

6/29/17

Date

Review and Approval

  
Cardinal Health

6/29/17

Date

## 1. DECOMMISSIONING PROCESS – CONCRETE WIRE SAWING

Based on the characterization described in the Remediation Work Plan and Ameriphysics' experience on similar projects, remediation is expected to be limited to approximately two feet of concrete and steel of the inner vault areas. Remediation of the vault will be performed using concrete wire saws, core drills, and other miscellaneous concrete saws.

The wall and ceiling of the vault will be cut in half to ensure most of the cutting is done in clean concrete. When cut in half, 0 - 2.5 ft. in deep from inner vault will contain the activated concert and 2.5 - 5 ft. from inner vault will be clean concrete. Clean concrete debris will be surveyed for free release (see section 6.4 of remediation work plan). Activated concrete debris will be packaged and shipped off as radioactive waste.

The floor will be cut in squares and hammered out. Only activated concrete will be taken out of the floor. This debris will be packaged and shipped off as radioactive waste.

## 2. WASTE WATER SAMPLING AND DISPOSAL

All waste water from cutting operations will be collected in 55-gallon drums and processed with a flocculent for settling of the solid particulates (slurry). After the drums have settled, the water will be decanted into a 500-gallon tank with filter bag to filter out any sediment that gets collected during the decanting. Then clean water will be pumped from the outside of filter bag to clean storage tanks. The water will be reused during the concrete demo to reduce waste water. When water needs to be released, it will be homogenized and sampled. The samples will be sent to GEL Laboratories in Charleston, SC for analysis by gamma spectroscopy. The analysis will include all potential radionuclides of concern listed in Table 1 of the Remediation Work Plan. The laboratory will need to achieve MDCs of less than 50% of the effluent release limits specified in 10 CFR 20 Appendix B, Table 2 Column 2.

*Table 1: Effluent release limits and MDC requirements*

Nuclide	Release Limits ( $\mu\text{Ci/ml}$ )	Required MDC
H-3	1.00E-03	5.00E-04
Na-22	6.00E-06	3.00E-06
Sc-46	1.00E-05	5.00E-06
Cr-51	5.00E-04	2.50E-04
Mn-54	3.00E-05	1.50E-05
Fe-55	1.00E-04	5.00E-05
Fe-59	1.00E-05	5.00E-06
Co-56	6.00E-06	3.00E-06

Nuclide	Release Limits ( $\mu\text{Ci/ml}$ )	Required MDC
Co-57	6.00E-05	3.00E-05
Co-58	2.00E-05	1.00E-05
Co-60	3.00E-06	1.50E-06
Zn-65	5.00E-06	2.50E-06
Nb-95	3.00E-05	1.50E-05
Ag-108m	9.00E-06	4.50E-06
Ag-110m	6.00E-06	3.00E-06
Cd-109	6.00E-06	3.00E-06
Sb-124	7.00E-06	3.50E-06
Cs-134	9.00E-07	4.50E-07
Eu-152	1.00E-05	5.00E-06
Eu-154	7.00E-06	3.50E-06
Eu-155	5.00E-05	2.50E-05

The values from Column 2 will be used as the radionuclide specific free release limits. Sum of fractions will be observed, and the combined results may not exceed unity. Water that meets this criterion will be released for disposal in the sanitary sewers. Water that does not meet this criterion will be either shipped to a licensed/permitted radioactive waste processor for processing and disposal or solidified on-site and sent for direct disposal at a licensed/permitted radioactive material disposal facility.

### 3. SLURRY COLLECTION AND RELEASE/SAMPLING

Slurry will be collected after water is decanted. Slurry will be solidified and then scanned for free release (see section 6.4 of the remediation work plan). Additionally, slurry will be spread out on plastic sheeting and scanned with a GM detector. Two samples of the highest GM readings from the slurry will be sent off for gamma spec analysis. If no activity is found in the solidified slurry, then the slurry will be disposed of as normal concrete waste. If activity is found then solidified slurry will be disposed of as radioactive waste.