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CardinalHealth

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MS-16

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REGION 1
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August 11, 2011

Betsy Ullrich
Licensing Assistance Team
Division of Nuclear Materials Safety
U.S. NRC Region I
475 Allentown Road
King of Prussia, PA 19406-1415

Re: Additional Information for NRC Radioactive Materials License 34-32780-02, Docket No. 030-38331, Control No. 575595, Cardinal Health PET Manufacturing Services, East Hartford, CT.

Licensing / Ms. Ullrich:

Cardinal Health Nuclear Pharmacy Services and Manufacturing Services (hereafter Cardinal Health) submits additional information in response to your request dated July 13, 2011 and in accordance with the above referenced license condition number 13.

This monthly progress report for financial assurance, to include a site-specific decommissioning funding plan (DFP) and cost estimate, and the financial assurance instrument with all supporting documents with regard to guidance in NUREG 1757, Volume 3 and 10 CFR 30.35. A list of the estimated quantities of activated materials with reference to 10 CFR 30, Appendix B is attached. The reference to the exempt quantity for Cobalt-57 is based on our research of more comprehensive and compatible U.S. Nuclear Regulatory Commission (NRC) Agreement States regulations corresponding to 10 CFR 30, Appendix B, assuring the safety of workers and the public for representative cyclotron operations in more than 30 locations in the United States.

Cardinal Health petitions the NRC to examine and revise the Appendix B quantities in 10 CFR Part 30 to add accelerator-produced (byproduct) radioactive materials such as Cobalt-57 using appropriate diligence for representative and responsible risk to update these exempt quantities used for financial assurance purposes. Until adequate byproduct quantities for accelerator-produced radioactive materials are included in 10 CFR 30 Appendix B, the financial burden in 10 CFR 30.35(d) to licensees, using the Appendix B footnote default value to 0.1 microcuries if isotopes are not included, is considered to be unnecessary and unfriendly to business in non-Agreement states.

REC'D IN LAT_ 8/25/11

575595
NMSS/RGN1 MATERIALS-002

If you have any questions regarding this response in the progress report or the enclosures, please contact me at 614.757.3147.

Sincerely,

Willie Regits, Ph D.
Corporate Radiation Safety Officer
Director, Health Physics
Nuclear Pharmacy Services

Enclosures: DFP and Cost Estimate
Financial Assurance Surety Bond (original)
List of Estimated Activated Materials (10 CFR 30 Appendix B sum of ratios)
Agreement States comparison for 10 CFR 30 Appendix B quantity for Cobalt-57*

cc: James Mathews, RSO (loc. 5869)
License File 5869 (2)

*

Regulation	Isotope	Half-Life	Activity	Unsealed Limit*	Ratio	**Divide by 10^5
10 CFR 30 Appendix B	*Co-57*	*270 Days*	*2 E 5 μCi*	*0.1*	*2 E 6*	*20*
COMPARISON TO OTHER AGREEMENT STATES EXEMPT QUANTITY FOR Cobalt-57						
Wisconsin[1]	*Co-57*	*270 Days*	*2 E 5 μCi*	*100*	*2.0 E 3*	*0.02*
Illinois[1]	*Co-57*	*270 Days*	*2 E 5 μCi*	*100*	*2.0 E 3*	*0.02*
Ohio[1]	*Co-57*	*270 Days*	*2 E 5 μCi*	*100*	*2.0 E 3*	*0.02*
Kentucky[1]	*Co-57*	*270 Days*	*2 E 5 μCi*	*100*	*2.0 E 3*	*0.02*
Kansas[1]	*Co-57*	*270 Days*	*2 E 5 μCi*	*100*	*2.0 E 3*	*0.02*
Texas[1]	*Co-57*	*270 Days*	*2 E 5 μCi*	*100*	*2.0 E 3*	*0.02*

[1]References: ***NRC Agreement State Regulations (online references underlined)***
Texas 25 TAC 289.252(jj)(2)
Wisconsin DHS 157 Appendix B
https://docs.legis.wisconsin.gov/code/admin_code/dhs/157_b
Illinois Title 32 Energy Chapter II, IEMA Part 330 Appendix B
http://www.iema.illinois.gov/legal/pdf/32_330.pdf
Ohio OAC 3701:1-40-11 Appendix A
Kentucky 902 KAR 100:080
http://www.lrc.ky.gov/kar/902/100/080.htm
Kansas KAR 28-35-197a. Schedule B

Isotope	Half Life	Max Qty (uCi)	Agreement State / Part 30 App B (uCi)	Ratio (R)	R / 10^5
Target foils & Target Bodies					
Al-28	2.24 min	10000			
Co-56	77.3 day	200000			
Co-57	270 day	100000	100	1.00E+03	1.00E-01
Co-58	71 day	50000			
Co-60	5.26 yr	50000	1	5.00E+04	5.00E+00
Co-64	12.9 hr	10000			
Cr-51	27.7 day	50000			
Cu-60	23.7 min	50000			
Cu-61	3.33 hr	25000			
Mn-52	5.59 day	200000			
Mn-52m	21.1 min	200000			
Mn-54	312.3 day	10000	10	1.00E+03	1.00E-01
Mn-56	2.58 hr	10000			
Mo-93m	6.85 hr	100000			
Na-24	14.96 hr	10000			
Nb-93m	16.13 yr	15000	10	1.50E+03	1.50E-01
Nb-94m	6.26 min	100000			
Nb-94	20300 yr	1000	1	1.00E+03	1.00E-01
Re-183	70 day	10000			
Re-184	38 day	10000			
Sc-48	43.7 hr	15000			
Tc-95m	61 day	10000			
Tc-96	4.28 day	10000			
V-47	32.6 min	15000			
V-48	16 day	15000			
Zn-63	38.5 min	15000			
Zn-65	244 day	15000	10	1.50E+03	1.50E-01
			SUM / R =	5.60E+04 / 100000	**0.560**
Cyclotron parts					
Zn-65	244 day	15000	10	1.50E+03	1.50E-01
Nb-94	20300 yr	1000	1	1.00E+03	1.00E-01
Na-22	2.6 yr	1000	1	1.00E+03	1.00E-01
Cd-109	463 day	1000	10	1.00E+02	1.00E-02
Ag-106m	8.28 day	1000			
Ag-110m	250 day	1000	100	1.00E+01	1.00E-03
			SUM / R =	5.96E+04 / 100000	**0.596**

License Number	Description	RAM Authorized by License or Reg	Max Qty
NRC 34-32780-02	Connecticut / NRC Region I	Fluorine-18	30 curies
	Dept. of Environmental Protection		
CT State Reg. 01567	Radioactive Material Registration	Nitrogen-13	10 curies
Cardinal Health		Oxygen-15	10 curies
PET Manufacturing Services			
131 East Hartland Street		Carbon-11	10 curies
East Hartford, CT 06108			
	16.5 MeV G.E. PETtrace	Activation Products	Total 5 curies
	cyclotron installed in (2007)		1 curie per nuclide
		Sodium-22 sealed source	
			200 microcuries

Cardinal Health leases space in this building

The Landlord of the space is: Fremont 131, LLC (Fremont Management) West Hartford, CT

Typical Waste Products: Typical activated components of the cyclotron are internal parts, targets, target bodies magnet coils, tanks, shielding and cables. Radioactive Wastes from target rebuilds replacement of parts or components during maintenance are packaged and shipped through LLRW radioactive waste brokers.

Name of room, laboratory or area:	Cyclotron Vault		
Level of Contamination:	MARSSIM Class 1 - Activated materials with concentrations up to 10's to 100's of pCi/gm		
COMPONENT	**NUMBER OF COMPONENTS**	**DIMENSIONS (ft^3)**	**Total Dimensions (ft^3)**
Glove Boxes	0	0	0
Fume Hoods	0	0	0
Lab Benches	0	0	0
Sinks	0	0	0
Sink Drains	0	0	0
Floors (20' x 20' x 1')	1	400	400
Wall A (14' x 10' x 1.5')	1	210	210
Wall B (12.5' x 10' x 1.5')	1	188	187.5
Wall C (20.25' x 10' x 1.5')	1	304	303.75
Wall D-1 (8.5' x 10' x 2.25')	1	191	191.25
Wall D-2 (14' x 10' x 1.5')	1	210	210
Ceiling (20' x 20' x 1')	1	400	400
Ventilation / Ductwork	1	30	30
Hot Cells	0	0	0
Equipment / Materials	1	15	15
Soil Plots	0	0	0
Shielding Tanks (16' x 10' x 9')	0	0	0
Storage Areas	0	0	0
Radwaste Areas (Storage Pit)	2	15	30
Scrap Recovery Areas	0	0	0
Maintenance Areas	0	0	0
Equipment Decon Areas	0	0	0
Other (specify) Cyclotron	1	231	231

Name of room, laboratory or area:	Clean Room		
Level of Contamination:	MARSSIM Class 3 - meets release criteria		
COMPONENT	**NUMBER OF COMPONENTS**	**DIMENSIONS OF COMPONENT (ft^3)**	**TOTAL DIMENSIONS (ft^3)**
Glove Boxes	0	0	0
Fume Hoods	0	0	0
Lab Benches	0	0	0

Sinks	0	0	0
Sink Drains	0	0	0
Floors (10' x10' x 2") Vestibule / DOT	1	17	16.67
Walls (10' x 10' x 1")	4	8	33.32
Ceiling (10' x 10' x 1")	1	8	8.33
Ventilation / Ductwork	3	10	30
Hot Cells	0	0	0
Mini Cells	0	0	0
Equipment / Synthesis modules	0	0	0
Soil Plots	0	0	0
Storage Tanks	0	0	0
Storage Areas	0	0	0
Radwaste Areas (within LAB)	0	0	0
Scrap Recovery Areas	0	0	0
Maintenance Areas	0	0	0
Equipment Decon Areas	0	0	0
Other (specify) Laminar Flow hood	1	24	24
Other (specify)	0	0	0
Name of room, laboratory or area:	Main Lab		
Level of Contamination:	MARSSIM Class 2 - meets release criteria		
COMPONENT	**NUMBER OF COMPONENTS**	**DIMENSIONS OF COMPONENT (ft^3)**	**TOTAL DIMENSIONS (ft^3)**
Glove Boxes	0	0	0
Fume Hoods	1	12	12
Lab Benches	5	30	150
Sinks	1	1	1
Sink Drains	1	1	1
Floors (20' x 40'x 2") Vestibule / DOT	1	133	133.33
Walls (20' x 10' x 1")	1	17	16.67
Ceiling (20' x 40' x 1")	1	67	66.67
Ventilation / Ductwork	4	30	120
Hot Cells	0	0	0
Equipment / Materials	9	2	18
Soil Plots	0	0	0

Storage Tanks	0	0	0
Storage Areas	0	0	0
Radwaste Areas (within LAB)	2	2	4
Scrap Recovery Areas	0	0	0
Maintenance Shop	0	0	0
Equipment Decontamination	0	0	0
Other (specify)	0	0	0
Other (specify)	0	0	0
Name of room, laboratory or area:	Engineering Room		
Level of Contamination:	MARSSIM Class 2 - meets release criteria		
COMPONENT	**NUMBER OF COMPONENTS**	**DIMENSIONS OF COMPONENT (ft^3)**	**TOTAL DIMENSIONS (ft^3)**
Glove Boxes	0	0	0
Fume Hoods	0	0	0
Lab Benches	1	30	30
Sinks	0	0	0
Sink Drains	0	0	0
Floors (20' x 10' x 2") Vestibule / DOT	1	33	33.33
Walls (10' x 10' x 1")	6	8	49.98
Ceiling (20' x 10' x 1")	1	17	16.67
Ventilation / Ductwork	1	30	30
Hot Cells	0	0	0
Equipment / Materials	2	5	10
Soil Plots	0	0	0
Storage Tanks	0	0	0
Storage Areas	0	0	0
Radwaste Areas (within LAB)	0	0	0
Scrap Recovery Areas	0	0	0
Maintenance Shop	1	50	50
Equipment Decontamination	0	0	0
Other (specify)	0	0	0
Other (specify)	0	0	0

Name of room, laboratory or area:	Production Room		
Level of Contamination:	MARSSIM Class 2 - meets release criteria		
COMPONENT	**NUMBER OF COMPONENTS**	**DIMENSIONS OF COMPONENT (ft^3)**	**TOTAL DIMENSIONS (ft^3)**
Glove Boxes	0	0	0
Fume Hoods	0	0	0
Lab Benches	2	30	60
Sinks	0	0	0
Sink Drains	0	0	0
Floors (20' x 10' x 2") Vestibule / DOT	1	33	33.33
Walls (10' x 10' x 1")	6	8	49.98
Ceiling (20' x 10' x 1")	1	17	16.77
Ventilation / Ductwork	2	30	60
Hot Cells	1	25	25
Equipment / Materials	4	20	80
Soil Plots	0	0	0
Storage Tanks	0	0	0
Storage Areas	0	0	0
Radwaste Areas (within LAB)	1	10	10
Scrap Recovery Areas	0	0	0
Maintenance Shop	0	0	0
Equipment Decontamination	0	0	0
Other (specify) Minicells	4	5	20
Other (specify)	0	0	0
Name of room, laboratory or area:	Anteroom		
Level of Contamination:	MARSSIM Class 3 - meets release criteria		
COMPONENT	**NUMBER OF COMPONENTS**	**DIMENSIONS OF COMPONENT (ft^3)**	**TOTAL DIMENSIONS (ft^3)**
Glove Boxes	0	0	0
Fume Hoods	0	0	0
Lab Benches	2	30	60
Sinks	0	0	0
Sink Drains	0	0	0
Floors (10' x 10' x 2") Vestibule / DOT	1	17	16.67
Walls (10' x 10' x 1")	4	8	33.32

Ceiling (10' x 10' x 1")	1	8	8.33
Ventilation / Ductwork	2	30	60
Hot Cells	0	0	0
Equipment / Materials	0	0	0
Soil Plots	0	0	0
Storage Tanks	0	0	0
Storage Areas	0	0	0
Radwaste Areas (within LAB)	0	0	0
Scrap Recovery Areas	0	0	0
Maintenance Shop	0	0	0
Equipment Decontamination	0	0	0
Other (specify)	0	0	0
Other (specify)	0	0	0
Name of room, laboratory or area:	Quarantine Room		
Level of Contamination:	MARSSIM Class 3 - meets release criteria		
COMPONENT	**NUMBER OF COMPONENTS**	**DIMENSIONS OF COMPONENT (ft^3)**	**TOTAL DIMENSIONS (ft^3)**
Glove Boxes	0	0	0
Fume Hoods	0	0	0
Lab Benches	0	0	0
Sinks	0	0	0
Sink Drains	0	0	0
Floors (10' x 10' x 2") Vestibule / DOT	1	17	16.67
Walls (10' x 10' x 1")	4	8	33.32
Ceiling (10' x 10' x 1")	1	8	8.33
Ventilation / Ductwork	2	30	60
Hot Cells	0	0	0
Equipment / Materials	0	0	0
Soil Plots	0	0	0
Storage Tanks	0	0	0
Storage Areas	0	0	0
Radwaste Areas (within LAB)	0	0	0
Scrap Recovery Areas	0	0	0
Maintenance Shop	0	0	0
Equipment Decontamination	0	0	0

PLANNING AND PREPARATION

Work Days

Estimate the number of workdays, by specific labor category, that will be required to complete planning and preparation activities.
Include all labor categories: Supervisor, Foreman, Craftsman, Technician, Health Physicist, Laborer, Clerical, and others as needed.

Activity	Project Manager	HPS / Foreman / Equip. Op.	Health Physicist / Shipper	HPT / Draftsman	Laborer	Clerical
Preparation of Documentation for Regulatory Agencies	1	0	1	0	0	1
Submittal of Decommissioning Plan	5	0	0	2	0	1
Development of Work Plans	2	1	1	0	0	1
Procurement of Special Equipment	1	0	0	0	0	1
Staff Training	0.5	1.5	1	0.5	1	0
Characterization of Radiological Conditions (includes sampling, soil and environmental analysis, groundwater analysis if applicable)	2	2	0	1	0	0
Other (specify) Mobilization	1	3	1	2	0	0
Totals	12.5	7.5	4	5.5	1	4

DECONTAMINATION OR DISMANTLING OF RADIOACTIVE FACILITY COMPONENTS

(Work Days)

Estimate the number of workdays, by specific labor category, that will be required to complete decontamination and/or dismantling activities for each facility component. Copy and complete this table as necessary for each room, laboratory or area. Rooms, laboratories or areas with similar levels of contamination may be consolidated in one table.

Name of Room, Laboratory or Area:	Cyclotron Vault						
Level of Contamination:	Class 1 - Activated materials with concentrations up to 10's or 100's of pCi / gm						
Component	Decon Method	Project Mgr.	HPS / Foreman Equip. Op.	Health Physicist/ Shipper	HPT / Draftsman	(2) Laborer	Clerical
Fume Hoods / Hot Cells	Remove / Disp						
Lab Benches	Remove / Disp						
Sinks	Remove / Disp						
Drains	Remove / Disp						
Floors	Remove / Disp	4	4		8	8	
Ventilation / Ductwork	Remove / Disp	1					
Hot Cells	Remove / Disp						
Maintenance Areas	Sur/Remove/Disp						
Soil Plots	Remove / Disp						
Shielding Tanks (16' x 10' x 9')	Remove / Disp	2	2		4	4	
Shielding Tanks Water	Sample	0.5	1		1	1	
Shielding Tanks Water	Remove / Disp	1	3		2	2	
Storage Areas	Remove / Disp						
Radwaste Areas	Remove / Disp						
Scrap Recovery Areas	NA						
Maintenance Areas	Remove / Disp						
Equipment Decon Areas	Remove / Disp						
Other (specify) Cyclotron	Remove / Disp	2	6		4	4	
Other (specify) Shipping	Remove / Disp			2			
TOTALS		10.5	16	2	19	19	

RESTORATION OF CONTAMINATED AREAS ON FACILITY GROUNDS

(Work Days)

Estimate the number of workdays, by specific labor category, that will be required to restore contaminated areas on facility grounds.

Activity	Project Mgr.	HPS / Foreman Equip. Op.	Health Physicist/ Shipper	HPT / Draftsman	(2) Laborer	Clerical
Restore Floors	1	1			2	
Restore Roof	3	3			6	
Restore Utilities						
Totals	4	4	0	0	8	0

FINAL RADIATION SURVEY

(Work Days)

Estimate the number of workdays, by specific labor category, that will be required to conduct a final radiation survey

Activity	Project Mgr.	HPS / Foreman Equip. Op.	Health Physicist/ Shipper	HPT / Draftsman	(2) Laborer	Clerical
FSS Setup	1		1			
Survey Packages	1					
Class 1	2	2		4	4	
Class 2	1	1		2		
Class 3	1	1		2		
Final Report	10					2
Totals	16	4	1	8	4	2

SITE STABILIZATION AND LONG TERM SURVEILLANCE

(Work Days)

Estimate the number of workdays, by specific labor category, that will be required to complete site stabilization and long term surveillance activities.

Activity	Project Mgr.	HPS / Foreman Equip. Op.	Health Physicist/ Shipper	HPT / Draftsman	(2) Laborer	Clerical
FSS Setup						
Survey Packages						
Class 1						
Class 2						
Class 3						
Final Report						
Totals	0	0	0	0	0	0

TOTAL WORK DAYS BY LABOR CATEGORY

(Work Days)

Estimate the total number of workdays, by specific labor category from the applicable table.

Task	Project Mgr.	HPS / Foreman Equip. Op.	Health Physicist/ Shipper	HPT / Draftsman	(2) Laborer	Clerical
Planning and Preparation	12.5	7.5	4	5.5	1	4
Decontamination and Dismantling Radioactive Components	10.5	16	2	19	19	0
Restoration of Contaminated Areas on Facility Grounds	4	4	0	0	8	0
Final Radiation Survey	16	4	1	8	4	2
Site Stabilization and Long-Term Surveillance	0	0	0	0	0	0
Totals	43	31.5	7	32.5	32	6

WORKER UNIT COST SCHEDULE

Estimate labor costs (including salary, fringe benefits, and corporate overhead). Include all appropriate labor categories including Supervisor, Foreman, Craftsman, Technician, Health Physicist, Laborer, Clerical and others as needed.

Labor Cost Component	Project Mgr.	HPS / Foreman Equip. Op.	Health Physicist/ Shipper	HPT / Draftsman	(2) Laborer	Clerical
Salary & Fringe	$ 125,000.00	$ 95,000.00	$ 90,000.00	$ 75,000.00	$ 45,000.00	$ 35,000.00
Overhead Rate (%)	50%	50%	50%	50%	50%	50%
Total Cost Per Year	$ 187,500.00	$ 142,500.00	$ 135,000.00	$ 112,500.00	$ 67,500.00	$ 52,500.00
Living Expense (PD*7/5)	$ 203.00	$ 203.00	$ 203.00	$ 203.00	$ -	$ -
Total Cost Per Work Day	$ 924.00	$ 751.00	$ 722.00	$ 636.00	$ 260.00	$ 202.00
Per Diem Rates	$145/day					

TOTAL LABOR COSTS BY MAJOR DECOMMISSIONING TASK

Estimate the total number of workdays, by specific labor category from the applicable table.

Task	Project Mgr.	HPS / Foreman Equip. Op.	Health Physicist/ Shipper	HPT / Draftsman	(2) Laborer	Clerical	Total Labor Cost
Planning and Preparation	$ 11,552.00	$ 5,633.00	$ 2,889.00	$ 3,496.00	$ 260.00	$ 808.00	$ 24,638.00
Decontamination and Dismantling Radioactive Components	$ 9,704.00	$ 12,017.00	$ 1,444.00	$ 12,078.00	$ 4,993.00	$ -	$ 40,236.00
Restoration of Contaminated Areas on Facility Grounds	$ 3,697.00	$ 3,004.00	$ -	$ -	$ 2,077.00	$ -	$ 8,778.00
Final Radiation Survey	$ 14,786.00	$ 3,004.00	$ 722.00	$ 5,086.00	$ 1,038.00	$ -	$ 24,636.00
Site Stabilization and Long-Term Surveillance	$ -	$ -	$ -	$ -	$ -	$ 20.20	$ 20.20
Totals	$ 39,739.00	$ 23,658.00	$ 5,055.00	$ 20,660.00	$ 8,368.00	$ 828.20	$ 98,308.20

PACKING, SHIPPING AND DISPOSAL OF RADIOACTIVE WASTES

(a) Packing Material Costs

Estimate the types and volumes of waste expected to be generated, along with the number and types of containers for packaging the waste. Multiply the number of containers required by the unit cost of the container.

Waste Type	Volume (ft^3)	Number of Containers	Type of Containers	Unit Cost of Container	Total Packaging
DAW / Concrete Slurry / Sealed Sources	168	12	Purchased Drum	$ 70.00	$ 840.00
Cyclotron	231	1	1280 ft^3 rented Seavan	$ 2,000.00	$ 2,000.00
Concrete Rubble / Slurry, Steel, Lead, DAW, and Sealed Source	300	1	1280 ft^3 rented Seavan	$ 2,000.00	$ 2,000.00
TOTAL					$ 4,840.00

(b) Shipping Costs

Estimate the number of truckloads of waste expected to be shipped. Multiply shipping costs per mile (including truckload costs surcharges, and overweight charges) by the total distance shipped.

Waste Type	Number of Truckloads	Unit Cost	Surcharges	Overweight Charges	Distance Shipped (miles)	Total Shipping Costs
Concrete Rubble / Slurry, Steel, Lead, DAW, and Sealed Source	1	$ 4.00	$ -	$ -	950	$ 3,800.00
Cyclotron	1	$ 4.00	$ -	$ 1.00	950	$ 4,750.00
TOTAL	2					$ 8,550.00

(c) Waste Disposal Costs

Estimate the volume of waste to be disposed. Multiply the volume of waste disposed by the unit disposal cost (including any volume-based surcharges). Add any surcharges that are based on the number of containers of waste.

Waste Type	Disposal Volume (ft^3)	Density (lb/ft^3)	Disposal Mass (lbs)	Unit Cost ($/lb)	Surcharges ($/$ft^3$ or $/container)	Total Shipping Costs
DAW	81	10	810	$ 6.00	0	$ 4,860.00
Cyclotron	231	200	46,200	$ 2.50	0	$ 115,500.00
Concrete/Slurry	64	160	10,240	$ 2.50	0	$ 25,600.00
Steel and Lead	54	74	4,000	$ 2.50	0	$ 10,000.00
Sealed Sources	8		100			$ 1,000.00
TOTAL	438					$ 156,960.00

RADIOACTIVE WASTE DISPOSAL COSTS (ITEMIZED)

(b) Shipping Costs

Estimate the number of truckloads of waste expected to be shipped. Multiply shipping costs per mile (including truckload costs surcharges, and overweight charges) by the total distance shipped.

Waste Type	Number of Truckloads	Unit Cost	Surcharges	Overweight Charges	Distance Shipped (miles)	Total Shipping Costs
Concrete Rubble / Slurry, Steel, Lead, DAW, and Sealed Source	1	$ 4.00	$ -	$ 4.30	950	$ 3,800.00
Cyclotron	1	$ 4.00	$ -	$ 1.00	950	$ 4,750.00
TOTAL	2					$ 8,550.00

(c) Waste Disposal Costs

Estimate the volume of waste to be disposed. Multiply the volume of waste disposed by the unit disposal cost (including any volume-based surcharges). Add any surcharges that are based on the number of containers of waste.

Waste Type	Disposal Volume (ft^3)	Density (lb/ft^3)	Disposal Mass (lbs)	Unit Cost ($/lb)	Surcharges ($/$ft^3$ or $/container)	Total Shipping Costs
DAW	81	10	810	$ 6.00	0	$ 4,860.00
Cyclotron	231	200	46,200	$ 2.50	0	$ 115,500.00
Concrete/Slurry	64	160	10,240	$ 2.50	0	$ 25,600.00
Steel and Lead	54	74	4,000	$ 2.50	0	$ 10,000.00
Sealed Sources	8		100			$ 1,000.00
TOTAL	438					$ 156,960.00

EQUIPMENT / SUPPLY COSTS (Excluding Containers)

Estimate the quantity of equipment and supplies required for decommissioning and multiply that quantity by the appropriate unit costs.

Equipment / Supplies	Quantity	Unit Cost	Total Equipment / Supply Cost
Protective Clothing (per dress out)	100	$ 8.00	$ 800.00
Instrumentation Rental (per week)	4	$ 250.00	$ 1,000.00
Misc. Tools (per week)	4	$ 1,000.00	$ 4,000.00
Crane Rental (per day)	2	$ 4,500.00	$ 9,000.00
Concrete Saw Rental (per week)	1	$ 1,000.00	$ 1,000.00
Forklift (per week)	1	$ 1,000.00	$ 1,000.00
Consumables (per week)	4	$ 1,000.00	$ 4,000.00
TOTAL			$ 20,800.00

LABORATORY COSTS

If applicable, estimate costs for the analyses to be performed by an independent third-party laboratory.

Activity	Quantity	Unit Cost	Total Item Cost
Sampling (captured in labor estimates)	0	$ -	$ -
Transport of Samples	3	$ 200.00	$ 600.00
Testing and Analysis - Concrete	23	$ 150.00	$ 3,450.00
Other (specify) Analysis - Water	4	$ 800.00	$ 3,200.00
TOTAL			$ 7,250.00

MISCELLANEOUS COSTS

Estimate any other applicable costs	
Activity	Total Item Cost
License Fees (Reciprocity)	$ 600.00
Insurance	$ -
Taxes	$ -
Other (specify)	$ -
TOTAL	$ 600.00

TOTAL DECOMMISSIONING COSTS

Enter the total costs reported by task/component into the appropriate cells below, and thenadd to obtain a subtotal. Add to the subtotal a contingency allowance of 25%

Task/Component	$ Cost	Percentage
Planning and Preparation	$ 24,638.00	8%
Decontamination and/or Dismantling of Components	$ 40,236.00	14%
Restoration of Contaminated Areas	$ 8,778.00	3%
Final Radiation Survey	$ 24,636.00	8%
Site Stabilization	$ 20.20	0%
Packing Material Costs	$ 4,840.00	2%
Shipping Costs	$ 8,550.00	3%
Waste Disposal Costs	$ 156,960.00	53%
Equipment / Supply Costs	$ 20,800.00	7%
Laboratory Analysis Costs	$ 7,250.00	2%
Miscellaneous Costs	$ 600.00	0%
SubTotal	$ 297,308.20	100%
25% Contingency	$ 74,327.05	25%
TOTAL Decommissioning Cost Estimate	**$ 371,635.25**	

A.9.4 Model Surety Bond

PAYMENT SURETY BOND

Date bond executed: 5-26-11

Effective date: 5-26-11

Principal: CARDINAL HEALTH 414, LLC

Type of organization: Limited Liability Company

State of incorporation: DE (if applicable)

NRC license number, name and address of facility, and amount for decommissioning activities guaranteed by this bond: Cardinal Health 414, LLC, 131 Hartland Ct., East Hartford, CT 06108, $500,000.00

Surety: TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA, One Tower Square, Bond/5PB, Hartford, CT

Type of organization: Corporation

State of incorporation: Connecticut (if applicable)

Surety's qualification in jurisdiction where licensed facility is located.

Surety's bond number: [redacted]

Total penal sum of bond: $ 500,000.00

Know all persons by these presents, that we, the Principal and Surety hereto, are firmly bound to the U.S. Nuclear Regulatory Commission (hereinafter called NRC) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety; but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

WHEREAS, the U.S. Nuclear Regulatory Commission, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in title 10, Chapter I of the *Code of Federal Regulations*, Part [*insert 30, 40, or 70*], applicable to the Principal, which require that a license holder or an

applicant for a facility license provide financial assurance that funds will be available when needed for facility decommissioning;

NOW, THEREFORE, the conditions of the obligation are such that if the Principal shall faithfully, before the beginning of decommissioning of each facility identified above, fund the standby trust fund in the amount(s) identified above for the facility;

Or, if the Principal shall fund the standby trust fund in such amount(s) after an order to begin facility decommissioning is issued by NRC or a U.S. District Court or other court of competent jurisdiction;

Or, if the Principal shall provide alternative financial assurance, and obtain NRC's written approval of such assurance, within 30 days after the date a notice of cancellation from the Surety is received by both the Principal and NRC, then this obligation shall be null and void; otherwise it is to remain in full force and effect.

The Surety shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above. Upon notification by NRC that the Principal has failed to perform as guaranteed by this bond, the Surety shall place funds in the amount guaranteed for the facility into the standby trust fund.

The liability of the Surety shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the Surety hereunder exceed the amount of said penal sum.

The Surety may cancel the bond by sending notice of cancellation by certified mail to the Principal and to NRC provided, however, that cancellation shall not occur during the 90 days beginning on the date of receipt of the notice of cancellation by both the Principal and NRC, as evidenced by the return receipts.

The Principal may terminate this bond by sending written notice to NRC and to the Surety 90 days prior to the proposed date of termination, provided, however, that no such notice shall become effective until the Surety receives written authorization for termination of the bond from NRC.

The Principal and Surety hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new amount, provided that the penal sum does not increase by more than 20 percent in any one year and no decrease in the penal sum takes place without the written permission of NRC.

If any part of this agreement is invalid, it shall not affect the remaining provisions that will remain valid and enforceable.

In Witness Whereof, the Principal and Surety have executed this financial guarantee bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety.

Principal CARDINAL HEALTH 414, LLC

[*Signatures*] _____
[*Names*] Jorge Gomez
[*Titles*] SVP and Treasurer
[*Corporate seal*]

Corporate Surety TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA

One Tower Square, Bond/5PB, Hartford, CT 06183

State of incorporation: Connecticut

Liability limit: $ 408,938,000

[*Signatures*] _____
[*Names and titles*] Kathleen J. Mailes, Attorney-in-Fact
[*Corporate seal*]

[*For every co-surety, provide signatures, names and titles, corporate seal, and other information in the same manner as for the Sureties above.*]

Bond Premium: $ 5,000.00

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 223391 **Certificate No.** 004121240

KNOW ALL MEN BY THESE PRESENTS: That St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company and St. Paul Mercury Insurance Company are corporations duly organized under the laws of the State of Minnesota, that Farmington Casualty Company, Travelers Casualty and Surety Company, and Travelers Casualty and Surety Company of America are corporations duly organized under the laws of the State of Connecticut, that United States Fidelity and Guaranty Company is a corporation duly organized under the laws of the State of Maryland, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Debra J. Doyle, Diane M. O'Leary, Douglas M. Schmude, Geoffrey E. Heekin, James B. McTaggart, Jennifer L. Jakaitis, Judith A. Lucky, Karen L. Daniel, Kathleen J. Mailes, Linda M. Iser, Richard A. Moore Jr., Sandra M. Martinez, Sandra M. Nowak, and Susan A. Welsh

of the City of Chicago, State of Illinois, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 15th day of March, 2011.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: _____
George W. Thompson, Senior Vice President

On this the 15th day of March, 2011, before me personally appeared George W. Thompson, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2011.

MARIE C. TETREAULT NOTARY PUBLIC CONNECTICUT

_____
Marie C. Tetreault, Notary Public

58440-4-09 Printed in U.S.A.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kori M. Johanson, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 26 day of May, 20 11.

Kori M. Johanson, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.

ACKNOWLEDGEMENT BY SURETY

STATE OF ILLINOIS
COUNTY OF COOK

On this 26 day of May, 2011, before me, Melissa L. Fortier, a Notary Public, within and for said County and State, personally appeared Kathleen J. Mailes to me personally known to be the Attorney-in-Fact of and for Travelers Casualty and Surety Company of America and acknowledged that she executed the said instrument as the free act and deed of said Company.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, at my office in the aforesaid County, the day and year in this certificate first above written.

Melissa L. Fortier

Notary Public in the State of Illinois
County of Cook

OFFICIAL SEAL
MELISSA L FORTIER
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 08/25/2014