WestVirginiaUniversity
RADIATION SAFETY DEPARTMENT

U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406-1415

MSB
Q-5

March 1, 2010

Attn: Betsy Ullrich, CHP
Senior Health Physicist
Commercial and R&D Branch
Division of Nuclear Materials Safety

Subject: Additional Information Concerning Application for New License

License No. 47-23035-03
Docket No. 030-38182 **Control No. 144281**

Dear Ms. Ullrich,

This is in response to your e-mail dated February 08, 2010, requesting additional information.

1) We intend to limit this item to 200 mCi per radionuclide. Therefore, the amendment shall reflect "our possession of any byproduct material with atomic numbers 1 through 83, any chemical/physical form of **Incidental Activated Products** to maximum possession limit of 3.5 Curies and 200 mCi per radionuclide.

2) When air flow test was conducted, the static pressure (SP) of EF-5 was shown to be negative 1.8 inches of water in which negative 2 inches of water is considered satisfactory. EF-5 (duct) serves the cyclotron and hot cells and fan EF-2 (duct) serves the laboratory exhaust hood at the east wall adjacent to the hot cells. The transfer cell that receives the isotope product from the cyclotron is equipped with blower which always maintains negative pressure in the hot cell through charcoal filters. The ventilation system will have a Stack Monitor with Alarm Levels Set Point of $1x10^{-7}$ uCi/ml which is in reference with the 10 CFR20 Appendix B value.

Robert C. Byrd Health Sciences Center
West Virginia University
WVU Hospitals

G-139 Health Sciences North
PO Box 9006
Morgantown, WV 26506-9006

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144281

NMSS/RGN1 MATERIALS-002

West Virginia University
Radiation Safety Department

3) a. Decommissioning Fund Plan (DFP) was reviewed and the contingency factor of 25% has been added in the decommissioning cost estimate.

b. 10 CFR30.35 (e) requires that our decommissioning funding plan to include a means of adjusting our cost estimate and associated funding levels at least every three years. Therefore, West Virginia University will obtain a new cost estimate from a **qualified third party every three years**.

c. Attached is Certification of Financial Assurance for the licensed activities covered by the Statement of Intent.

Enclosed, please find additional documentation.

Sincerely yours,

Nasser Razmianfar
Director and Radiation Safety Officer

Cc: Radiological Safety Committee

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WestVirginiaUniversity

Office of the Provost

CERTIFICATION OF FINANCIAL ASSURANCE

March 18, 2010

West Virginia University
P.O. Box 9006
Morgantown, WV 26506

NRC License # 47-23035-03

West Virginia University- Cyclotron Facility
Robert C.Byrd Health Science Center South
One Medical Center Drive, Room # B-043A
Morgantown, WV 26506

Issued to: U.S.Nuclear Regulatory Commission

We certify that West Virginia University-Cyclotron Facility is licensed to possess the following types of unsealed byproduct materials [incidental activated isotopes] with a half-life greater than 120 days licensed less than 10 CFR Parts 30 in the following amount.

Types of Material **Amount of Material**

Isotope	Half-Life	Location Where Isotope Might Appear	MAX mCi
Berylium-10	1.51E+06 years	Polyethylene (3% B), Boric Acid solution in tanks	0.005
Cadmium-109	1.24 years	Target Inserts, Frits, QMA, Delivery lines, Silver parts	200
Calcium-41	1.03E+06 years	In concrete	0.01
Carbon-14	5730 years	In concrete	0.0007
Cesium-134	2.1 years	In concrete	0.01
Cobalt-57	1.24 years	D-tips, HAVAR foils	150
Cobalt-60	5.26 years	Concrete, Yoke, Target insert, Ion source, Target body	36
Europium-152	13.2 years	In concrete	0.35
Europium-154	16 years	In concrete	0.035
Hafnium-172	1.87 years	Collimator, Beam probe	0.1
Iron-55	2.73 years	Iron yoke, Self shield plate steel	200
Lutetium-173	1.37 years	Collimator, Ion source	0.1
Manganese-54	312.5 days	Yoke, Target body, Gate valves, etc.	17
Nickel-59	7.6E+04 years	Aux Equipment	0.01
Nickel-63	100.1 years	Aux Equipment	1.5
Rhenium-184	165 days	Dee tips	0.1
Silver-108m	418 years	Target holder	0.1
Silver-110	252 days	Magnet and targets	2
Sodium-22	2.602 years	Target Insert, Bodies, Gate valve, Carbon of the extractors	25
Tritium H3	12.33 years	Concrete, Once-used target water, Shield water tanks	35
Tungston-181	121.2 days	Collimator, Probe	0.1
Zinc-65	244 days	Target body, Gate Valve, Extractor holder, RF Dees, Extraction cartridge, Ion source	35

Academic Affairs
Research
Extension and Public Service
Information Technology

Stewart Hall
PO Box 6203
Morgantown, WV 26506-6203

Fax: 304-293-7554
www.wvu.edu/~acadaff/

We also certify that financial assurance in the amount of **$356,263.68** (three hundred fifty-six thousand two-hundred sixty –three dollars and sixty eight cents) has been obtained from the responsible unit for the purpose of decommissioning as prescribed by 10 CFR Part 30. This amount will be available if the need should arise.

Sincerely yours,

Michele G. Wheatly, Ph.D.
Provost and Vice President
For Academic Affairs

Christopher C. Colenda, MD, MPH
Chancellor for Health Sciences

Cc: Nasser Razmianfar, Director and Radiation Safety Officer
Fred Butcher, VP for Planning and Operations
Gary Marano, Interim President/CEO of UHA
Sahar Saaid, Radiology Administrator
Radiological Safety Committee

Gregory S. Hisel, MS, MBA, CHP
Health Physics Consulting Services

Cost Estimation for Decommissioning WVU PETtrace

Background Information

West Virginia University owns a GE PETtrace cyclotron, currently operated by IBA North America, which is used for the production of short lived isotopes, primarily Fluorine-18 (^{18}F), used in making radiopharmaceuticals. The United States Nuclear Regulatory Commission requires that WVU submit a decommissioning cost estimate and decommissioning funding plan to ensure that arrangements are in place for funding of the decommissioning should the licensee become insolvent. The purpose of requirement for decommissioning financial assurance is to ensure that the government would not incur the cost of remediation of the licensed facility, should it be abandoned. Therefore, the amount of financial assurance should be sufficient for the NRC to contract a third party to perform any required remediation, waste disposal, and decommissioning activities necessary for license termination as per NRC regulations.

To ensure the financial assurance is sufficient to cover the cost of decommissioning, the following assumptions are made as to the most likely state that would exist at the site should a licensee abandoned operations or become insolvent:

1. All radioactive waste existing at the site is left behind
2. All equipment at the site where the intrinsic value exceeds the cost of waste disposal has been removed from the site (does not include removal of cyclotron or shielding)
3. No cleanup or decontaminations were performed prior to abandonment.
4. No status surveys of contamination were performed or are available.
5. The borated water in the self-shielding tanks contains only short-lived radioisotopes which will be allowed to self-decay. The water, therefore, would not need to be disposed of as radioactive waste, but the shielding tanks would.
6. No real estate costs for the facility are included in this estimate

The following are the specific tasks that would need to be accomplished and is essentially how, as a consultant, I would bid to do this decommissioning work.

SCOPE OF WORK: Generic steps to the decommissioning:

1. Project kickoff meeting with client
2. Characterize the site (waste, contamination, activation)
3. Remediate activated structures (concrete, steel, etc.)
4. Package and dispose of waste
5. Develop final status survey plan (MARSSIM)
6. Have regulatory authority review plan
7. Perform the MARSSIM survey
8. Write a report and send to submit to regulatory authority along with request for license termination

Specific Tasks:

Task 1 – Task Order Management and Project Planning

This task includes project planning and management activities, which include administration, staffing, scheduling, client support, and cost control for the course of the project. The anticipated project duration is 12 months.

Task 2 – Structure Activation and Waste Characterization

This task includes travel to the site, labor support for the characterization of known contamination, sampling for analytic analysis of radioactive waste, and core sampling for analytic analysis of potentially activated concrete or other building materials, and collection of shielding water for analysis.

- The expected duration of this task on site is 5 days, not including travel to and from the site from Hartford, CT for 3 persons.
- Eight hour days are assumed
- Travel costs include airfare, per diem living expenses, 1 car rental, and fuel.
- Equipment rental is priced for two weeks
- Packaging of identified waste

Task 3 – Analysis of Sample Results

Following sampling and characterization, an analysis will be made for the need for remediation of structural materials (e.g. activated concrete). This analysis will likely involve application of the RESRAD or DandD computer dose modeling codes and comparison with the 25 mrem/yr maximum year criteria for residual radioactive materials. A report indicating what parts, if any, of the structure would need to be remediated for activation products, would be generated for acceptance prior to remediation activities.

Task 4 –Remediation of Activated Construction Materials (optional)

This task will only be utilized in the event that the analysis in Task 3 reveals that remediation of activated structural materials is required.

- Anticipated duration of this task is 5 days including travel to and from the site for 3 persons from Hartford, CT
- Eight hour days are assumed
- Travel costs include airfare, per diem living expenses, 1 car rental, and fuel.
- Equipment rental is priced for two weeks
- Packaging of remedial waste
- Waste Disposal Costs for 2 55-gal drums of waste (activated concrete rubble)

Task 5 – Develop FSS Plan

A MARSSIM style Final Status Survey Plan would be developed for the site IAW NRC NUREG-1727. This plan will be submitted for acceptance prior to implementation.

Task 6 – Perform Waste Shipments and Implement FSS Plan

This task included performing a FSS, decontamination of contaminated building surfaces equipment or items, packaging of investigation derived waste, and final shipment of all wastes.

- Anticipated duration of this task is 8 days including travel to and from the site for 3 persons from Hartford, CT
- Eight hour days are assumed
- Travel costs include airfare, per diem living expenses, 1 car rental, and fuel.
- Equipment rental is priced for two weeks
- Disassembly and waste packaging of cyclotron, associated components, and shielding tanks
- Waste disposal costs include two 55-gal drums of higher level waste (Envirocare) and ten 90 ft^2 steel B-25 boxes of low level waste (US Ecology)

Task 7 – FSS Report

A report will be written to include all findings of the FSS and demonstrate that they meet the criteria laid out in the FSS Plan.

The table below shows a summary of the project costs per task for decommissioning the facility in the scenario of company insolvency. See the attached pricing sheets for details.

Task 1 – Task Order Management and Project Planning	$ 23,345.53
Task 2 – Structure Activation and Waste Characterization	$ 34,714.16
Task 3 – Analysis of Sample Results	$ 8,052.93
Task 4 – Remediation of Activated Materials (optional)	$ 22,313.92
Task 5 – Develop FSS Plan	$ 19,554.51
Task 6 – Perform Waste Shipments and Implement FSS Plan	$ 153,661.48
Task 7 – FSS Report	$ 23,368.42
Total Estimated Decommissioning Cost	$ 285,010.94

The DFP must include the estimated decommissioning costs plus a contingency factor as described in NUREG-1757, "Consolidated NMSS Decommissioning Guidance", V3. It is recommended in Section A.3.1.2.3, that a contingency factor of 25% be used, unless the licensee chooses to demonstrate why a lower contingency factor is appropriate.

Therefore, WVU should submit a DFP to the NRC with a total decommissioning funding amount of the estimated decommissioning cost plus 25% **($356,263.68)**, or demonstrate why a lower contingency factor should apply.

Self-Shielded PETtrace facility. Assume 240 AMP-hours per year (conservative assumption).

Cyclotron Activation Products with half-life of more than 120 days.

Isotope	Half-Life	Location Where Isotope Might Appear	MAX mCi	10CFR30 AppB mCi	Ratios
Berylium-10	1.51E+06 years	Polyethylene (3% B), Boric Acid solution in tanks	0.005	0.0001	5.00E+01
Cadmium-109	1.24 years	Target inserts, Frits, QMA, Delivery lines, Silver parts	200	0.01	2.00E+04
Calcium-41	1.03E+06 years	In concrete	0.01	0.0001	1.00E+02
Carbon-14	5730 years	In concrete	0.0007	0.1	7.00E-03
Cesium-134	2.1 years	In concrete	0.01	0.001	1.00E+01
Cobalt-57	1.24 years	D-tips, HAVAR foils	150	0.0001	1.50E+06
Cobalt-60	5.26 years	Concrete, Yoke, Target insert, Ion source, Target body	36	0.001	3.60E+04
Europium-152	13.2 years	In concrete	0.35	0.001	3.50E+02
Europium-154	16 years	In concrete	0.035	0.001	3.50E+01
Hafnium-172	1.87 years	Collimator, Beam probe	0.1	0.0001	1.00E+03
Iron-55	2.73 years	Iron yoke, Self shield plate steel	200	0.1	2.00E+03
Lutetium-173	1.37 years	Collimator, Ion source	0.1	0.0001	1.00E+03
Manganese-54	312.5 days	Yoke, Target body, Gate valves, etc.	17	0.01	1.70E+03
Nickel-59	7.6E+04 years	Aux Equipment	0.01	0.1	1.00E-01
Nickel-63	100.1 years	Aux Equipment	1.5	0.01	1.50E+02
Rhenium-184	165 days	Dee tips	0.1	0.0001	1.00E+03
Silver-108m	418 years	Target holder	0.1	0.0001	1.00E+03
Silver-110	252 days	Magnet and targets	2	0.0001	2.00E+04
Sodium-22	2.602 years	Target insert, Bodies, Gate valve, Carbon of the extractors	25	0.0001	2.50E+05
Tritium H3	12.33 years	Concrete, Once-used target water, Shield water tanks	35	0.0001	3.50E+05
Tungston-181	121.2 days	Collimator, Probe	0.1	0.01	1.00E+01
Zinc-65	244 days	Target body, Gate Valve, Extractor holder, RF Dees, Extraction cartridge, Ion source	35	0.01	3.50E+03
				Sum of the Ratios	**2.19E+06**