

# Yale Environmental Health & Safety

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November 17, 2015

Mr. Michael Reichard  
U.S. NRC Region I  
2100 Renaissance Blvd., Suite 100  
King of Prussia, PA 19406-2713

**Subject: Request for More Information on Yale University Broadscope Renewal Application**  
Broadscope License #06-00183-03 *1030-00582*

REC RG 1 11 23 15 PM 07 24

Dear Mr. Reichard,

Thank you for your timely review of Yale University's Broadscope renewal application. The following information is provided in response to your request for additional information dated October 7th, 2015 and received via email. The responses correspond with the numbers associated in your letter.

1. The checklist from Appendix C of NUREG-1556, Volume 5 has been reviewed. A printed version is included with the appropriate items checked as you requested. A clarifying note regarding equipment used for counting leak tests, was included on the checklist for section 10.7.
2. In your email you requested additional information regarding the request to remove the Cobalt-60 source line item (BBB) from Yale University NRC License # 06-00183-03.

Enclosed you will find written confirmation from the receiving vendor that the source has indeed been transferred. In addition leak test results for the last leak test performed on this source are as follows:

Leak test was performed on January 27, 2015 and no counts above background were detected. Result recorded as  $< 0.005$  uCi.

If you have any further questions on these matters, please contact me at 203.737.2140 or [tammy.stemen@yale.edu](mailto:tammy.stemen@yale.edu). Thank you for your timely assistance.

Sincerely,



Tammy Stemen, CHP  
Radiation Safety Officer  
Yale University

*588238*  
NMSS/RGNI MATERIALS-002

## **Appendix C**

### **Suggested Format for Providing Information Requested in Items 5 Through 11 or NRC Form 313**

**Suggested Format for Providing Information Requested in Items 5 Through 11 or NRC Form 313**

**Table C.1 Items 5 & 6: Materials to Be Possessed and Proposed Uses**

Yes	No	Radioisotope	Manufacturer or Distributor Model No.	Quantity	Use As Listed on SSD Registration Certificate	Specify Other Uses Not Listed on SSD Registration Certificate
✓		Cesium-137	Each of the following requested sealed sources, devices, and source/device combinations is the subject of an approved Sealed Source and Device Registration Certificate: Sealed source manufacturer's (or distributor's) name and model number: <i>S.L. Shepherd model G810</i> Device manufacturer's (or distributor's) and model number: <i>SL Shepherd model G810</i>	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> Uses are: (Submit safety analysis supporting safe use)

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Yes	No	Radioisotope	Manufacturer or Distributor Model No.	Quantity	Use As Listed on SSD Registration Certificate	Specify Other Uses Not Listed on SSD Registration Certificate
	✓	Cobalt-60	<p>Each of the following requested sealed sources, devices, and source/device combinations is the subject of an approved Sealed Source and Device Registration Certificate: Sealed source manufacturer's (or distributor's) name and model number:</p> <hr/> <p>Device manufacturer's (or distributor's) and model number:</p> <hr/>	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes [ ]	<p>[ ] Not applicable</p> <hr/> <p>[ ] Uses are:</p> <hr/> <p>(Submit safety analysis supporting safe use)</p>
	✓	Strontium-90	<p>Each of the following requested sealed sources, devices, and source/device combinations is the subject of an approved Sealed Source and Device Registration Certificate: Sealed source manufacturer's (or distributor's) name and model number:</p> <hr/> <p>Device manufacturer's (or distributor's) and model number:</p> <hr/>	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes [ ]	<p>[ ] Not applicable</p> <hr/> <p>[ ] Uses are:</p> <hr/> <p>(Submit safety analysis supporting safe use)</p>

Yes	No	Radioisotope	Manufacturer or Distributor Model No.	Quantity	Use As Listed on SSD Registration Certificate	Specify Other Uses Not Listed on SSD Registration Certificate
	✓	Other (specify)	Sealed source manufacturer or distributor and model number:  Device manufacturer or distributor and model number:	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes [ ]	[ ] Not applicable [ ] Uses are:  (Submit safety analysis supporting safe use)
<i>Financial Assurance Required and Evidence of Financial Assurance Provided</i>						

**Table C.2 Items 7 Through 11: Training and Experience, Facilities and Equipment, Radiation Safety Program, and Waste Disposal**

Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
7. Individual(s) Responsible For Radiation Safety Program And Their Training And Experience	Before obtaining licensed materials, the proposed RSO will have successfully completed the training described in Appendix G in NUREG - 1556, Vol. 5, dated October 1998  AND	✓	[ ]
7.1 Radiation Safety Officer (RSO) Name: <i>Tammy Stemen</i>	Before being named as the RSO, future RSOs will have successfully completed the training described in Appendix G in NUREG - 1556, Vol. 5 dated October, 1998. Within 30 days of naming a new RSO, we will submit the RSO's name to NRC for inclusion in our license.		
7. Individual(s) Responsible For Radiation Safety Program And Their Training And Experience			
7.2 Authorized Users	Before using licensed materials, authorized users will receive the training described in Appendix G in NUREG - 1556, Vol. 5, dated October 1998	✓	[ ]

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Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
8. Training for Individuals Working in or Frequenting Restricted Areas	The applicant's training program will be examined during inspection, but should not be submitted in the license application.	Need Not Be Submitted with Application	
9. Facilities and Equipment	We will ensure that each area where a self-shielded irradiator is located corresponds to the "Conditions of Normal Use" and "Limitations and/or Other Considerations of Use" on the applicable irradiator's Sealed Source and Device Registration Certificate; the floor beneath a self-shielded irradiator is adequate to support the weight of the irradiator; each self-shielded irradiator is secured to prevent unauthorized access or removal; <i>and</i> each area where a self-shielded irradiator is located is equipped with an automatically operated fire detection and control system (sprinkler, chemical, or gas) or the location of the area and other controls ensure a low-level radiation risk attributable to fires.	<input checked="" type="checkbox"/>	[]
10. Radiation Safety Program 10.1 Audit Program	The applicant's program for reviewing the content and implementation of its radiation protection program will be examined during inspections, but should <i>not</i> be submitted in the license application.	Need Not Be Submitted with Application	
10. Radiation Safety Program 10.2 Radiation Monitoring Instruments	<p>We will use instruments that meet the radiation monitoring instrument specifications published in Appendix K to NUREG - 1556, Vol. 5, dated October, 1998. Additionally, each survey meter will have been calibrated by the manufacturer or other person authorized by the NRC or an Agreement State to perform survey meter calibrations no more than 12 months before the date the meter is used.</p> <p style="text-align: center;"><b>OR</b></p> <p>We will use instruments that meet the radiation monitoring instrument specifications published in Appendix K to NUREG - 1556, Vol. 5, dated October, 1998. Additionally, we will implement the model survey meter calibration program published in Appendix K to NUREG - 1556, Vol. 5, dated October, 1998, and we will ensure that each survey meter will have been calibrated no more than 12 months before the date the meter is used.</p>	<input checked="" type="checkbox"/>	[]

Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
10. Radiation Safety Program 10.3 Material Receipt and Accountability	Physical inventories will be conducted at intervals not to exceed 6 months to account for all sealed sources and devices received and possessed under the license.	<input checked="" type="checkbox"/>	[ ]
10. Radiation Safety Program 10.4 Occupational Dose	Either we will perform a prospective evaluation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10% of the allowable limits in 10 CFR Part 20 or we will provide dosimetry that meets the Criteria in the section entitled "Radiation Safety Program - Occupational Dose" in NUREG - 1556, Vol. 5, dated October, 1998.	<input checked="" type="checkbox"/>	[ ]
10. Radiation Safety Program 10.5 Public Dose	No response is required from the applicant in a license application, but documentation demonstrating compliance will be examined during inspection.	Need Not Be Submitted with Application	
10. Radiation Safety Program 10.6 Operating & Emergency Procedures	If we change our operating and emergency procedures without amending our license, we will ensure that: the changes are reviewed and approved by licensee management and the RSO; affected licensee staff are trained in the procedures before they are implemented; the changes are consistent with applicable license conditions and the procedures or commitments submitted in the license application; and the changes do not degrade the safety of the program.  <b>AND</b>  Operating and emergency procedures will be developed, implemented, maintained, and distributed and will meet the Criteria in the section entitled, "Radiation Safety program - Operating and Emergency Procedures" in NUREG - 1556, Vol. 5, dated October, 1998.	<input checked="" type="checkbox"/>          <input checked="" type="checkbox"/>	[ ]          [ ]

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Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
10. Radiation Safety Program 10.7 Leak Test	<p>Leak tests will be performed at intervals approved by the NRC or an Agreement State and specified in the Sealed Source and Device Registration Certificate. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services for other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the manufacturer's (or distributor's) and kit supplier's instructions.</p> <p style="text-align: center;"><b>OR</b></p> <p>Leak tests will be performed at intervals approved by the NRC or an Agreement State and specified in the Sealed Source and Device Registration Certificate. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services for other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the manufacturer's (or distributor's) and kit supplier's instructions. As an alternative, we will implement the model leak test program published in Appendix P to NUREG - 1556, Vol. 5, dated October, 1998.</p>	<p style="text-align: center;">[]</p>	<p style="text-align: center;">[]</p>
10. Radiation Safety Program 10.8 Maintenance	<p><u>ROUTINE MAINTENANCE</u> We will implement and maintain procedures for routine maintenance of our self-shielded irradiators according to each manufacturer's (or distributor's) written recommendations and instructions.</p> <p><u>NON-ROUTINE MAINTENANCE</u> We will have the self-shielded irradiator manufacturer (or distributor's) or other person authorized by NRC or an Agreement State perform non-routine maintenance.</p>	<p style="text-align: center;">[X]</p> <p style="text-align: center;">[X]</p>	<p style="text-align: center;">[]</p> <p>[ ] The information listed in Appendix I supporting a request to perform non-routine maintenance in-house is attached.</p>

*Note: Equipment used for counting leak tests for sources containing isotopes emitting both beta and gamma radiation may include NaI well counters, gamma counters, liquid scintillation counters and/or gas proportional counters.*



Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
10. Radiation Safety Program 10.9 Transportation	No response is needed from applicants during the licensing phase. However, before offering a Type B package for shipment, a licensee needs to have registered with NRC as a user of the package and obtained NRC's approval of its QA program. Transportation issues will be reviewed during inspection.	Need Not Be Submitted with Application	
10. Radiation Safety Program 10.10 Minimization of Contamination	The applicant does <i>not</i> need to submit a response to the minimization of contamination section if the applicant's responses meet the criteria for the following sections: "Radioactive Material - Sealed Sources and Devices," "Facilities and Equipment," "Radiation Safety Program - Operating and Emergency Procedures," "Radiation Safety Program - Leak Tests," and "Waste Management - Self-Shielded Irradiator Transfer and Disposal."	Need Not Be Submitted with Application	
11. Waste Management 11.1 Self-Shielded Irradiator Disposal & Transfer	The applicant does <i>not</i> need to provide a response to this item during the licensing phase. However, the licensee should develop, implement, and maintain self-shielded irradiator transfer and waste disposal procedures in its radiation safety program.	Need Not Be Submitted with Application	



**ECOLOGY SERVICES, INC.**

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10427 Hickory Path Way  
Knoxville, TN 37922  
Phone (865) 766-5873  
Fax (865) 766-5908

November 10, 2015

Wesley Bridges  
Yale University  
PO Box 208112  
New Haven, CT 06520-8112

*Re: Receipt Acknowledgement at ESI Warehouse*

Dear Wesley:

The radioactive sealed source shipped on Manifest No. 0267-062315ALA from Yale University – 350 Edwards Street on June 23, 2015, was received at Ecology Services' licensed warehouse facility, located in Baltimore, MD, on June 30, 2015. In order to maximize transportation costs and minimum delivery fees imposed by processors, the source is currently awaiting consolidation with material from other generators destined for Alaron Nuclear Services in Wampum, PA.

Source Details:

Isotope: Co-60  
Activity: 1.108 mCi  
Form: Cylinder

Upon delivery of the above referenced sealed source to Alaron and in accordance with the requirements of 10 CFR Part 20, Appendix G, Ecology Services will provide Yale University with a formal receipt acknowledgment, verifying delivery of material to the designated processing facility.

If you have any questions or concerns, please feel free to contact me in the office at (865) 766-5873 or by email at [mpatterson@ecologyservices.com](mailto:mpatterson@ecologyservices.com).

Sincerely,

A handwritten signature in cursive script that reads "Michele Patterson".

Michele Patterson  
Brokerage Operations Manager  
Ecology Services, Inc.

Estimated burden per response to comply with this information collection request: 46 minutes. This uniform manifest is required by NRC to meet reporting requirements of Federal and State Agencies for the safe transportation and disposal of low-level waste. Send comments regarding burden estimate to the Records and FOIA/Privacy Services Branch (T-8 FB), U.S. Nuclear Regulatory Commission, Washington, DC 20585-0001, or by Internet e-mail to [infocoll@nrc.gov](mailto:infocoll@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOS-10202, (3180-0184), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

NRC FORM 540 (8-2010)		U.S. NUCLEAR REGULATORY COMMISSION UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER		5. SHIPPER - NAME AND FACILITY ESI @ Yale University 350 Edwards Street New Haven, CT 06520		SHIPMENT ID NUMBER 0267-062315ALA		7. FORM 540 AND 540A FORM 541 AND 541A FORM 542 AND 542A ADDITIONAL INFORMATION		PAGE 1 OF 1 PAGE(S) 1 PAGE(S) 1 PAGE(S) NONE PAGE(S)		8. MANIFEST NUMBER (Use this number on all continuation pages) 0267-062315ALA					
1. EMERGENCY TELEPHONE NUMBER (include Area Code) 855-347-8197		USER PERMIT NUMBER T-MD004-G15		SHIPMENT NUMBER 0267-062315ALA		PROCESSOR <input checked="" type="checkbox"/> COLLECTOR		GENERATOR TYPE (Specify)		9. CONSIGNEE - Name and Facility Address Alaron Nuclear Services Operated by Alaron Nuclear Services 2138 Stele Route 18 Wampum, PA 16157		CONTACT Mike Odowid TELEPHONE NUMBER (include Area Code) (724) 535-5777					
ORGANIZATION 3E Company		CONTACT Brenda Armstrong		TELEPHONE NUMBER (include Area Code) (203) 432-3219		EPA I.D. NUMBER MDR000524712		SIGNATURE - Authorized consignee acknowledging waste receipt		DATE		10. CERTIFICATION This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and in proper condition for transportation and disposal in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulation.					
2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST 1		6. CARRIER - Name and Address Ecology Services, Inc. 9135 Guilford Road, Suite 200 Columbia, MD 21046		TRUCK # TRAILER #		SHIPPING DATE 06/23/15		TELEPHONE NUMBER (include Area Code) 301-362-8700		DATE 6/23/15					
A. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO If "Yes", provide Manifest Number		EPA MANIFEST NUMBER N/A		CONTACT Greg Keck		SIGNATURE - Authorized carrier acknowledging waste receipt <i>Greg Keck</i>		DATE 6/23/15		AUTHORIZED SIGNATURE <i>Sal Anselmi</i>		TITLE ENV. Tech					
11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number, and any additional information)		12. DOT LABEL "RADIOACTIVE"		13. TRANSPORT INDEX		14. PHYSICAL AND CHEMICAL FORM		15. INDIVIDUAL RADIONUCLIDES		16. TOTAL PACKAGE ACTIVITY MBq   mCi		17. LSA/SCO CLASS		18. TOTAL WEIGHT OR VOLUME (Use appropriate units)		19. IDENTIFICATION NUMBER OF PACKAGE	
UN2910, Radioactive material, excepted package-limited quantity of material 7 SEALED SOURCES 1 - 30 GAL DRUM		NA		NA		SOLID/METAL OXIDES		CO-60		4.0679E+01   1.1075E+00		NA		4.10 ft <sup>3</sup> 450.00000 lb		2015080807 (15-000863)	
FOR CONSIGNEE USE ONLY				20. Generator Certification Statement A) Radioactive Materials: Certification is hereby made that this shipment of low-level radioactive waste has been prepared in accordance with a radioactive waste management program which has been approved by the Nuclear Regulatory Commission or an Agreement State regulatory agency and with the current revision of the site specific Acceptance Criteria. B) Hazardous Materials: Generator hereby certifies that this material does not contain a hazardous waste as defined in 40 CFR 261. C) Date: Generator hereby represents and warrants that all data set forth in this (EPA/USEPA LOW-LEVEL RADIOACTIVE WASTE MANIFEST) are true and correct in all respects and in accordance with all applicable governmental laws, rules, regulations and the Radiological Material License. D) INFECTIOUS SUBSTANCE: Generator hereby certifies that this material does not contain any infectious substances as defined in 42 CFR 172.204 <i>Sal Anselmi</i> <i>Sal Anselmi</i> 6/23/15													