

# Yale Environmental Health & Safety

135 College Street, Suite 100  
New Haven, Connecticut 06510-2411

Telephone: 203 785-3550  
Fax: 203 785-7588  
[www.yale.edu/ehs](http://www.yale.edu/ehs)

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

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.

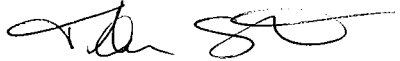
1. The checklist from Appendix C of NUREG-1556, Volume 5 has been reviewed. A printed version is included with the appropriate items checked as you requested. A clarifying note regarding equipment used for counting leak tests, was included on the checklist for section 10.7.
2. In your email you requested 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

## **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 0810</i> Device manufacturer's (or distributor's) and model number: <i>S.L. Shepherd model 0810</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: <u>Tammy Stemes</u>	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"/>	<input 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"/>	<input type="checkbox"/>



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Item No. and Title	Suggested Response	Yes	Alternative Procedures Attached
<p>10. Radiation Safety Program 10.7 Leak Test</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.</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>
<p>10. Radiation Safety Program 10.8 Maintenance</p>	<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 black ink that reads "Michele Patterson". The signature is fluid and cursive, with the first name being more prominent.

Michele Patterson  
Brokerage Operations Manager  
Ecology Services, Inc.

Electronic transfer of information to comply with the information collection requirements of Federal and State Agencies for the safe transportation and disposal of low-level waste. Send comments regarding burden estimates to the Records and Regulatory Services Branch (7-5753), U.S. Nuclear Regulatory Commission, Washington, DC 20545-0001. If a manifest is used to impose an information collection does not display a normally 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 SHIPPING MANIFEST		SHIPPING PAPER	
1. EMERGENCY TELEPHONE NUMBER (include Area Code)		3. SHIPPER - NAME AND FACILITY		SHIPMENT ID NUMBER		7. FORM 540 AND 540A	
855-347-8197		ESJ @ Yale University 350 Elm Street New Haven, CT 06520		0287-082315ALA		FORM 540 AND 540A ADDITIONAL INFORMATION	
ORGANIZATION		USER PERMIT NUMBER		PROCESSOR		PAGE 1 OF 1 PAGE(S)	
3E Company		T-MC004-G15		(Specify)		1 PAGE(S)	
2. IS THIS AN EXCLUSIVE USER SHIPMENT?		8. CARRIER - Name and Address		TELEPHONE NUMBER		8. MANIFEST NUMBER	
[ ] YES [X] NO		Ecolys Services, Inc. 8735 Guilford Road, Suite 200 Columbia, MD 21046		(include Area Code)		(Use this number on all continuation pages)	
4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT?		EPA MANIFEST NUMBER		EPA I.D. NUMBER		9. CONTACT	
[ ] YES [X] NO		N/A		MDC00524712		Mike Odoms	
If "Yes", provide Manifest Number _____		CONTACT		SHIPPING DATE		TELEPHONE NUMBER	
		Greg Keck		08/22/05		(include Area Code)	
11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number, and any additional information)		13. TRANSPORT INDEX		15. INDIVIDUAL RADIOISOTOPES		10. CERTIFICATION	
UN2810, Radioactive material, excepted package-limited quantity of material, 7		NA				This is to certify that the bench-tested manifests 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 manifests are accurate, 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.	
1 - 30 GAL DRUM		14. SOLIDMETAL FORM		DATE		TITLE	
		CO-60		8-23-15		ENV Tech	
12. DOT LABEL "RADIOACTIVE"		16. TOTAL PACKAGE ACTIVITY		17. LEASCO CLASS		18. TOTAL WEIGHT	
NA		MqCi		NA		4.10 g <sup>2</sup>	
19. IDENTIFICATION NUMBER OF PACKAGE		18. TOTAL WEIGHT		19. IDENTIFICATION NUMBER OF PACKAGE		DATE	
2015666907		480.0000 lb		2015666907		8/23/15	
20. Generator Certification Statement		19. IDENTIFICATION NUMBER		20. GENERATOR CERTIFICATION STATEMENT			
I, the undersigned, certify that the information provided in this manifest is accurate and that the waste is in accordance with the requirements of 10 CFR 20.20 and 61.1, or equivalent State regulation. I also certify that the waste is in accordance with the requirements of 10 CFR 20.20 and 61.1, or equivalent State regulation.		SAI Amelia		SAI Amelia		6/23/15	

NRC Form 540 (8-2010)

Modified Date: 08/22/05 11:50