

**Research Center**

411 Silver Lane  
East Hartford, CT 06108  
(860) 610-7000



September 15, 2004

*NMSS*

Licensing Assistant Section  
Nuclear Materials Safety Branch  
U.S. Nuclear Regulatory Commission, Region I  
475 Allendale Road  
King Of Prussia, Pa 19406-1415

*03003795*

Subject: Notice of Licence Termination (NRC License # 06-07522-01)

Enclosures: (a) NRC Form 314 "Certificate of Disposition of Materials"  
(b) Final Site Decommissioning Survey Results

Dear reader:

United Technologies Research Center (UTRC) respectfully requests termination of NRC License # 06-07522-01. UTRC has permanently ceased all licensed activities and has transferred all licensed materials to other specific licensees. UTRC has no detectable residual radioactivity and is suitable for unrestricted use.

Should you have any questions or require additional information regarding this submittal, please call Anthony Frigiani at (860) 610-7295.

Sincerely,

UNITED TECHNOLOGIES CORPORATION  
Research Center

A handwritten signature in black ink, appearing to read "Kay Adams", written over the printed name.

Kay Adams  
Director, Physical Sciences Department

04 SEP 20 P2:19

RECEIVED  
REGION 1

*135711*

**NMSS/RGNI MATERIALS-002**

## CERTIFICATE OF DISPOSITION OF MATERIALS

Estimated burden per response to comply with this mandatory collection request: 30 minutes. This submittal is used by NRC as part of the basis for its determination that the facility is released for unrestricted use. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0028), 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.

LICENSEE NAME AND ADDRESS

United Technologies Corporation  
United Technologies Research Center  
411 Silver Lane  
East Hartford, Connecticut 06108

LICENSE NUMBER

06-07522-01

DOCKET NUMBER

03003795

LICENSE EXPIRATION DATE

October 31, 2011

- ☐ This license has expired. ☒ **A. LICENSE STATUS (Check the appropriate box)**  
This license has not yet expired; please terminate it.

**B. DISPOSAL OF RADIOACTIVE MATERIAL**

(Check the appropriate boxes and complete as necessary. If additional space is needed, provide attachments)

The licensee, or any individual executing this certificate on behalf of the licensee, certifies that:

- ☐ 1. No radioactive materials have ever been procured or possessed by the licensee under this license.
- ☒ 2. All activities authorized by this license have ceased, and all radioactive materials procured and/or possessed by the licensee under this license number cited above have been disposed of in the following manner:
- ☒ a. Transfer of radioactive materials to the licensee listed below:
- AEA Technology QSA, Inc., Rusty Barrett, (225) 751-5893, November 27, 2002 and December 9, 2002, Louisiana License No. LA-5934-L01
  - 3M Corporate Health Physics, Frederick B. Entwistle, (651) 736-0740, December 4, 2002, NRC License No. 22-00057-03
  - Alaron Corp., Joseph Harverson, (724) 535-5777, March 24, 2003, NRC License No. 37-20826-01
  - Siemens Building Technologies, Inc., Harry Lee, (973) 593-2600, April 10, 2003, NRC License No. 29-08864-03
- ☐ b. Disposal of radioactive materials:
- ☐ 1. Directly by the licensee:
- ☐ 2. By license disposal site:
- ☐ 3. By waste contractor:
- ☒ c. All radioactive materials have been removed such that any remaining residual radioactivity is within the limits of 10 CFR Part 20, Subpart E, and is ALARA.

**C. SURVEYS PERFORMED AND REPORTED**

- ☒ 1. A radiation survey was conducted by the licensee. The survey confirms:
- ☐ a. the absence of licensed materials
- ☒ b. that any remaining residual radioactivity is within the limits of 10 CFR 20, Subpart E, and is ALARA.
- ☒ 2. A copy of the radiation survey results:
- ☒ a. is attached; or ☐ b. is not attached (Provide explanation); or ☐ c. was forwarded to NRC on: \_\_\_\_\_ Date
- ☐ 3. A radiation survey is not required as only sealed sources were ever possessed under this license, and
- ☐ a. The results of the latest leak test are attached; and/or ☐ b. No leaking sources have ever been identified.

The person to be contacted regarding the information provided on this form:

NAME	TITLE	TELEPHONE (Include Area Code)	E-MAIL ADDRESS
Glenn Janowsky	Radiation Safety Officer	(860) 610-7018	janowsqt@utrc.utc.com

Mail all future correspondence regarding this license to:

Anthony Frigiani, (860) 610-7295, frigiaaj@utrc.utc.com

**C. CERTIFYING OFFICIAL**

I CERTIFY UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT

PRINTED NAME AND TITLE	SIGNATURE	DATE
Kay Adams/Director, Physical Sciences	<i>Kay Adams</i>	September 15, 2004

WARNING: FALSE STATEMENTS IN THIS CERTIFICATE MAY BE SUBJECT TO CIVIL AND/OR CRIMINAL PENALTIES. NRC REGULATIONS REQUIRE THAT SUBMISSIONS TO THE NRC BE COMPLETE AND ACCURATE IN ALL MATERIAL RESPECT. 18 U.S.C. SECTION 1001 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

**FINAL RADIOLOGICAL STATUS REPORT**  
**UNITED TECHNOLOGIES RESEARCH CENTER**  
**411 SILVER LANE**  
**EAST HARTFORD, CONNECTICUT**

*Prepared for*  
*UTRC*

By  
Radiation Safety Associates, Inc.  
19 Pendleton Drive, PO Box 107  
Hebron, CT 06248  
(860) 228-0487 [www.radpro.com](http://www.radpro.com)

Report date  
June 18, 2004

## 1.0 INTRODUCTION

The United Technologies Research Center (UTRC) facility is located at silver Lane, East Hartford, Connecticut, and was used for Research and development. It operated under broad scope Nuclear Regulatory Commission (NRC) materials license number 06-07522-01 for the purpose of performing research and development as defined in 10 CFR 30.4.

## 2.0 SITE DESCRIPTION

Licensed activities were carried out in various rooms and buildings over the years. Based upon a review of the relevant records, the following rooms were identified as radioactive materials use or storage areas:

*Table 1. Rooms where radioactive material use was confirmed.*

Building	Room	Isotopes Used	MARSSIM Class	Survey Unit	Area
G	E125G, E127G	All	1	D	38 m <sup>2</sup>
G	E129G	All	1	C	24 m <sup>2</sup>
H	S263H/S265H, Chem. Storage rm.	All	1	A	58 m <sup>2</sup>
H	N263H/N265H	All	1	B	54 m <sup>2</sup>
D	N158D, N160D (Test Stand 30A)	Uranium (UF <sub>4</sub> )	1	E	36 m <sup>2</sup>
D	SD163D (Test Stand 31)	Uranium (UF <sub>4</sub> )	1	F	80 m <sup>2</sup>
D	SD170D (Test Stand 34)	Uranium (UF <sub>4</sub> )	1	G	45 m <sup>2</sup>
D	SD172D (Test Stand 33)	Uranium (UF <sub>4</sub> )	1	H	20 m <sup>2</sup>
D	SD171D (Test Stand 36)	Uranium (UF <sub>4</sub> )	1	I	25 m <sup>2</sup>

UTRC possessed a broad scope radioactive materials license. Over the life of the license the following isotopes were used:

*Table 2. Isotopes confirmed to have been used at UTRC.*

Al-28	Cd-109	Fe-55	Mn-54	Po-210	Sn-121	Xe-133
Am-241	Cl-36	Fe-59	Mo-99	Pt-197	Sr-85	Zn-65
Au-198	Cm-244	Gd-153	Na-22	Pt-199	Sr-89	Zr-90
Au-199	Co-57	H-3	Na-24	Pu-238	Sr-90	Zr-95
Ba-133	Co-60	Hf-181	Ni-63	Ra-226	Th-228	
Bi-210	Cr-51	Hg-203	P-32	S-35	Tl-204	
C-14	CS-134	I-129	Pa-234	Sc-46	Tm-170	
Ca-45	Cs-137	Ir-192	Pb/Bi-210	Si-31	U-233	
Ca-47	Cu-64	Kr-85	Pm-147	Sm-153	U-235	

UTRC possesses a long history of radioactive material receipt, use, and disposal that dates back to the early 1960's. Summary tables of material receipt and disposal records are contained in Attachment F. Records indicate that UTRC had one unmonitored Krypton-85 release of 108.5 Curries to the environment in 1966.

Due to the nature of the record keeping at the time, there are quantity inconsistencies that result in a discrepancy between the amount of elemental uranium purchased and disposed. However, UTRC believes all uranium has been properly disposed since all uranium-use areas have been properly surveyed and no measurements have exceeded the uranium DCGL. In addition, survey records and sealed source records over the life of the license indicate that radioactivity levels were low, confined to a few specific areas, and contamination incidents were infrequent.

Table 3 lists the short-lived isotopes possessed by UTRC along with their dates of disposal. Sufficient time has passed for each of these isotopes to decay to the point where their activities are indistinguishable from background.

*Table 3. Short-lived radioisotopes possessed by UTRC, their half-lives and disposal dates.*

Isotope	T <sub>1/2</sub>	Disposal	Isotope	T <sub>1/2</sub>	Disposal
Al-28	24 Min	1966	P-32	14.24 Days	1978
Au-198	2.69 Days	1970	Pt-197	18.3 Hours	1970
Au-199	3.14 Days	1970	Pt-199	30.8 Min	1970
Bi-210	5.01 Days	1992	S-35	87.44 Days	1965
Ca-47	4.54 Days	1966	Sc-46	83.8 Min	1975
Cr-51	27.7 Days	1965	Si-31	157.3 Min	1970
Cu-64	12.7 Hours	1969	Sm-153	46.7 Hours	1962
Fe-55	44.6 Days	1975	Sr-85	64.84 Days	1966
Hf-181	42.39 Days	1965	Sr-89	50.55 Days	1963
Hg-203	46.6 Days	1962	Xe-133	5.25 Days	1968
Ir-192	74.02 Days	1972	Zr-90	888 Ms	1964
Mo-99	66.02 Hours	1966	Zr-95	64.02 Days	1977
Na-24	15 Hours	1973			

At the time the final radiological status surveys were performed, all of the rooms identified above, with the exception of room E129G, had not been used for licensed activities for several years. They are currently being used as analytical laboratories (N263H/N265H, S263H/S265H), Engineering and storage areas (Test Stands 30A, 31, 33, 34 and 36, E125G and E127G).

Room E129G has been recently active as a radioactive material use area. However, only sealed sources have been used here for the past several years. At the time of the surveys, all radioactive waste had been shipped for disposal.

### 3.0 SUMMARY OF INVESTIGATIONS

This final radiological status survey was conducted in July 2002, with some follow-up measurements made in March 2003, under the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance for final status radiological surveys for demonstrating compliance with dose or risk-based regulations or standards. Based upon the history of radioactive materials use and advice from the RSO, all of the designated rooms were designated MARSSIM Class 1 areas. Because of their proximity and small size, rooms E125G and E127G were taken as a single survey unit. Rooms N263H and N265H were also taken as a single survey unit, as were S263H, S265H and the chemical Storage closet. All other rooms were each taken as a separate survey unit. No single survey unit exceeded the 100m<sup>2</sup> maximum permissible area for a Class 1 survey unit.

### 4.0 OBJECTIVES

The objective of the final status survey plan is to detail the survey and sampling methodologies that will be used in the final radiological status survey to demonstrate the effectiveness of decontamination efforts and that residual radioactivity levels meet the release criteria.

### 5.0 DERIVED CONCENTRATION GUIDELINE LEVELS (DCGLs)

Remediation goals for the final status survey will be to achieve the derived concentration guidelines (DCGLs) established for the area. DCGLs established for this survey are summarized in Table 4. With the exception of the survey units in Building D, where thorium was not used, all alpha emissions will be considered to be due to natural thorium plus progeny. The thorium DCGL is far more restrictive than that for any other alpha-emitter possessed by UTRC. Therefore, all measurements for total and removable alpha that meet the restrictive thorium DCGL will meet the less restrictive DCGLs for the other isotopes. Thorium daughters are assumed to be in equilibrium and are included in the DCGL for natural thorium. In Building D only uranium in the form of uranium tetra fluoride (UF<sub>4</sub>), was used. Therefore all alpha emissions in Building D are considered to be due to uranium, and the DCGL for uranium was used for surveys in this area.

With the exception of tritium, carbon-14 and iodine-129, the DCGL for lead/bismuth-210 will be used as the DCGL for all beta emitters. This is the most restrictive DCGL for the beta emitters used by UTRC. All measurements that meet this restrictive DCGL will meet the less restrictive DCGL for other beta emitting isotopes. Because of the difficulty in detecting tritium and iodine 125 with a hand held detector, wipes counted by liquid scintillation counter will be compared against the DCGL for tritium, carbon-14 and iodine-125. The DCGLs for tritium, carbon-14 and iodine-129 wipes were each set at 1000 dpm/100cm<sup>2</sup>.

The DCGL values are taken from Table 5.19, Concentration (dpm/100cm<sup>2</sup>) equivalent to 25 mrem/y for the specified value of P<sub>crit</sub>, published in the Federal Register on Wednesday,

November 18, 1998 (FR, Vol. 63, No. 222, Notices, p.5-43 – 5-46). These DCGLs are provided by the Nuclear Regulatory Commission and correspond to an annual dose of 0.25 mSv (25 mrem) using the default parameters that are generated by the approach to be used in the new version of DandD. DCGLs for the beta/gamma emitting isotopes (except tritium) were set at 10% of the specified values for total activity and 1% for removable activity. The tritium DCGL was set at 1000 dpm/100cm<sup>2</sup>

## 6.0 DATA QUALITY OBJECTIVES

As part of the DQO process the objective of the survey and the null and alternate hypotheses should be clearly stated. In demonstrating that this objective is met, the null hypothesis,  $H_0$ , tested is that residual contamination exceeds the release criterion; the alternative hypothesis,  $H_a$ , is that residual contamination meets the release criterion.

Since the alpha-emitting contaminants that are present in the facility are also presumed present in background, the Wilcoxon Rank Sum (WRS) test is used to determine the number of data points needed for statistical tests. The acceptable decision error rates were determined during the DQO process to reflect the anticipated difficulty of measuring residual thorium alpha radioactivity at near-background levels. The Type I error ( $\alpha$ ) was specified as 0.05 and Type II decision error ( $\beta$ ) was set at 0.05.

The shift,  $\Delta$ , also referred to as the lower bound of the gray region (LBGR), was set as 50% of the DCGL.

The square roots of the DCGLs were taken as the standard deviation values used for calculation of the sample sizes. The exceptions to this were the standard deviations for thorium wipes and direct measurements were based upon the results of measurements taken during the scoping survey. These data are summarized in the following table.

**Table 4. Derived Concentration Guideline Values for UTRC.**

	NRC DCGL (dpm/100cm <sup>2</sup> )	Site Specific DCGL (dpm/100cm <sup>2</sup> )	$\Delta$ (dpm/100cm <sup>2</sup> )	$\sigma$ (dpm/100cm <sup>2</sup> )	$\Delta/\sigma$	Samples per Survey Unit	Statistical Test
<sup>Nat</sup> Th Wipe	0.6	0.6	0.3	0.1	6	9	WRS
<sup>Nat</sup> Th Direct	6	6	3	0.5	6	9	WRS
<sup>Nat</sup> U Wipe	2.6	2.6	1.3	0.6	2.2	12	WRS
<sup>Nat</sup> U Direct	26.4	26.4	13.2	3.6	25.66	9	WRS
<sup>210</sup> Pb/Bi Wipe	54.7	54.7	27.3	5.2	49.28	14	Sign
<sup>210</sup> Pb/Bi Direct	547	547	273	16.5	16.64	14	Sign
<sup>3</sup> H Wipe	1.24E+7	1000	500	22.4	27.27	14	Sign
<sup>125</sup> I Wipe	3.47E+3	1000	500	22.4	27.27	14	Sign
<sup>14</sup> C Wipe	3.67E+5	1000	500	22.4	27.27	14	Sign

Direct surveys and measurements were performed using instruments appropriate for the site being measured. Using the background data from the Reference areas, the background and sample count times were calculated to achieve the lower limit of detection (LLD) of 6 dpm/100cm<sup>2</sup> required by the DCGL for natural thorium. Calculations of detection limits for beta emitters revealed that the count times for thorium were adequate to achieve the required detection limit for beta emitters. Background count times are indicated in the survey data in Attachment E. Calibration certificates for the instruments used can be found in Attachment A. In addition to the direct surveys, an exposure rate survey was performed on all Class 1 areas. All readings were found to be indistinguishable from background. The calibration certificates for this instrument can also be found in attachment A.

Wipe samples for gross alpha-beta were counted on a gas proportional counter using a background count time of 300 minutes and a sample count time of 10 minutes. Each wipe in building D was taken over an area of 100 cm<sup>2</sup> in order to achieve the desired detection limit. In Room E129G and in the physical chemistry labs (S263/265H, N263/265H, 125G, 127G and 129G) wipes were taken over an area of 600 cm<sup>2</sup> to achieve the required detection limit. Wipe samples for tritium, carbon-14 and iodine-125 were counted on a liquid scintillation counter calibrated with quenched standards of H-3, C-14 and I-125. Calibration records are maintained for these instruments by RSA Laboratories, Division of Radiation Safety Associates, Inc.

Calculations of all the LLDs and MDAs are shown in Attachment B.

## **7.0 PROCEDURES - OVERVIEW**

### **7.1 Class 1 Areas**

All survey units in the facility was designated as a class 1 area as a result of the historical evaluation of radioactive materials use. The total square footage of each survey unit is stated in Table 1 of this report. The associated radioactive materials used are also stated in the same table.

### **7.2 Class 2 Area**

No Class 2 areas were identified in this facility.

### **7.3 Class 3 Area**

No Class 3 areas were identified in this facility.

### **7.4 Reference Area**

Background measurements were taken outside of the Class 1 survey units on surfaces similar to those inside the survey units but which were not subject to exposure from licensed radioactive materials. Background counts for each instrument were for a length of time sufficient to achieve LLD for the most restrictive alpha or beta emitter.




## **8.0 Conclusions**

Results for the analysis of total contamination and removable contamination are presented in Attachment D. No single measurement exceeds either the DCGL for total or removable contamination for that survey unit. Therefore the residual radioactivity that is distinguishable from background radiation at this facility will result in a TEDE to an average member of the critical group of less than 25 mrem per year. The residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).

The State of Connecticut requires that the residual radioactivity that is distinguishable from background radiation at this facility must result in a TEDE to an average member of the critical group of less than 19 mrem per year, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). No single measurement exceeds 76% of the DCGLs used for this survey. Therefore the residual radioactivity that is distinguishable from background radiation at this facility will result in a TEDE to an average member of the critical group of less than 19 mrem per year



Jay R. Dockendorff, DPM  
Laboratory Director

  
K. Paul Steinmeyer, RRPH  
Senior Health Physicist

## **LIST OF ATTACHMENTS**

- A Instrument Calibration Certificates
- B MDA Calculations
- C Maps of the Class 1 Areas
- D Wipe survey results
- E Direct Survey Results
- F Summary Tables Of Material Receipt And Disposal Records





# **ATTACHMENT A**

## **Instrument Calibration Certificates**



# CERTIFICATE OF CALIBRATION

(COUNT-RATE INSTRUMENT)



**RSA Laboratories, Inc.**

21 Pendleton Drive, P.O. Box 61

Hebron, Connecticut 06248

(860) 228-0721 Fax (860) 228-4402

Customer and Contact: Radiation Safety Associates, Inc. Attn: K. Paul Steinmeyer (860) 228-0487

Customer Address: P.O. Box 107, 19 Pendleton Drive, Hebron, CT 06248

Inst. Mfr. & Model Ludlum Model 2224

Inst. Type Scaler/Ratemeter

Inst. s/n 119815

Det. Mfr. & Model Ludlum 43-37

Det. Type Gas-Proportional

Det. s/n 103776

Cal. Date 27 March 2002

Due Date 27 September 2002

Cal. Interval 6 months

Environmental conditions: Temperature: 74°F Relative Humidity 30% Atmospheric Pressure 29.42 inches Hg

Pre-calibration Checks:

☒ Contamination survey

☒ Battery check

☐ Slow response check

☒ Det. volts 1715 Vdc

☒ Mechanical check

☒ Audio check

☐ Window operation

☒ Meter zero

☒ Reset check

☒ Plateau check

☒ Geotropism check

☐ Fast response check

☐ Alarm set

☒ Input sens. \*See comments

☒ Pulse generator s/n 94926

☐ Oscilloscope s/n 171-04928

☒ Voltmeter s/n 57410002

☒ HV Readout (2 points) Ref./Inst. 900 V/ 900 V Ref./Inst. 1700 V/ 1700 V

Comments: \* Alpha threshold = 70 mV; Beta threshold = 3 mV; Beta window = 3 mV to 22 mV. Unit calibrated as floor monitor, Ludlum 239-1F #103873. Th-230 efficiency determined with source in contact with probe. Local background  $\approx$  11 cpm alpha, 852 cpm beta.

S/N of source used for precision check #0210

Isotope Th-230

Dedicated Source? ☐ Yes ☒ No

Reading #1 10,052 cpm

Reading #2 9,381 cpm

Reading #3 9,460 cpm

Mean 9,631 cpm

Precision: ☒  $\pm < 10\%$  ☐  $\pm 10-20\%$  ☐ Out of tolerance

Range Multiplier	Reference Calibration Point	Instrument Indication
x 1000	400,000 cpm	400,000 cpm
x 1000	100,000 cpm	100,000 cpm
x 100	40,000 cpm	40,000 cpm
x 100	10,000 cpm	10,000 cpm
x 10	4000 cpm	4000 cpm
x 10	1000 cpm	1000 cpm
x 1	400 cpm	400 cpm
x 1	100 cpm	100 cpm
1 min. count	100,000 cpm	100,037 cpm

All ranges calibrated electronically.

Range Multiplier	Cal. Source Used (isotope and S/N)	Source Activity (dpm)	Instrument Reading (cpm)	4 $\sigma$ Instrument Efficiency (%)
1 min. count	C-14 #4456	202,100	10 (a) 15,403 (B)	0.0% 7.2%
1 min. count	Pm-147 #5381	15,662	14 (a) 2,778 (B)	0.0% 12.3%
1 min. count	Tc-99 #D702	23,064	11 (a) 4,542 (B)	0.0% 16.0%
1 min. count	Cs-137 #2886	18,756	12 (a) 4,960 (B)	0.0% 21.9%
1 min. count	Cl-36 #D700	23,598	13 (a) 6,280 (B)	0.0% 23.0%
1 min. count	Sr/Y-90 #D711	47,066	15 (a) 13,330 (B)	0.0% 26.5%
1 min. count	Th-230 #91TH2200210	38,900	5,849 (a) 2,214 (B)	15.0% 3.5%

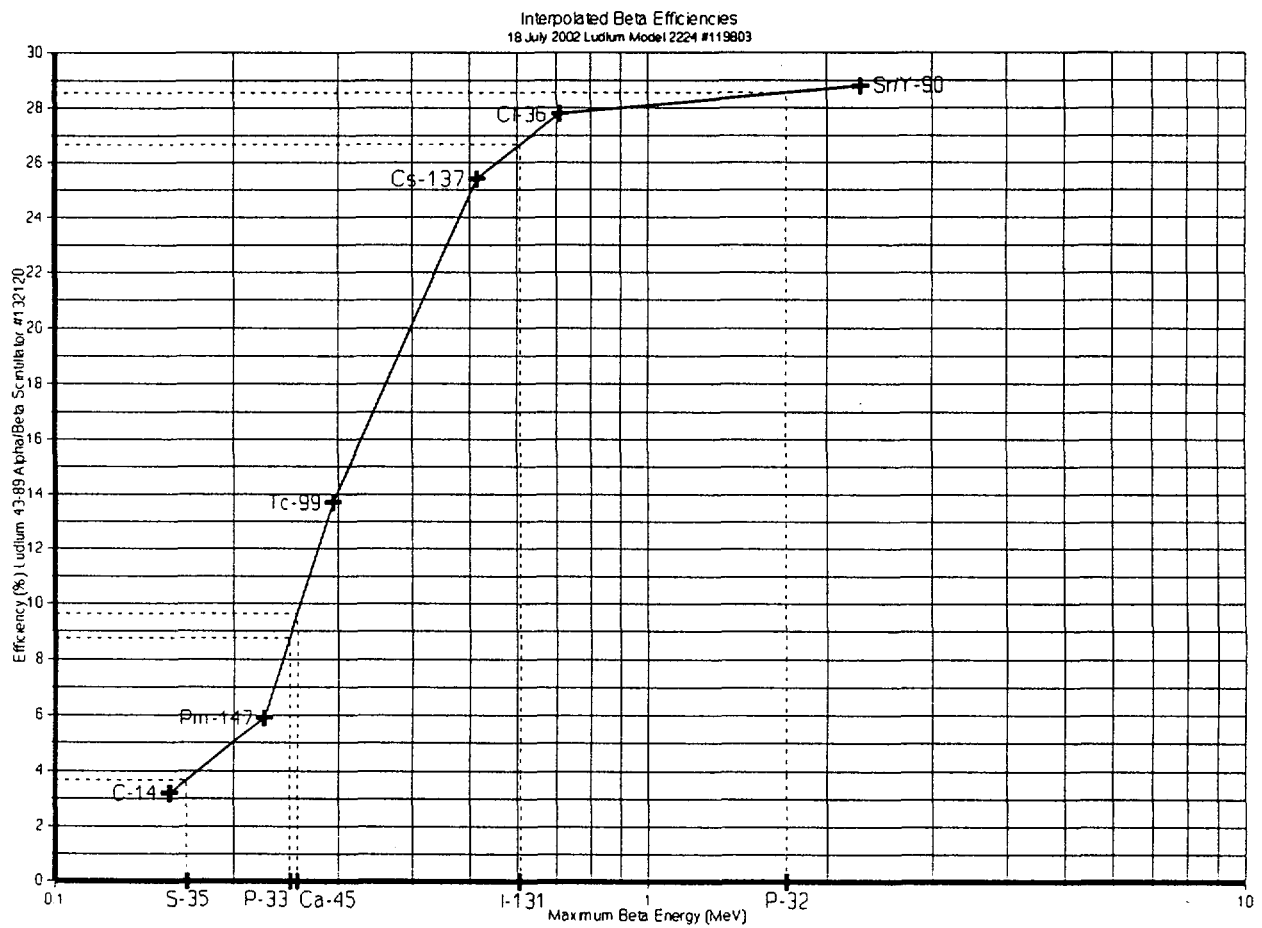
RSA Laboratories ID# 5678. Instrument indicates within  $\pm 10\%$  of calibration points unless otherwise indicated. Source-to-detector entry window distance for efficiency determinations is 1 cm unless otherwise specified. RSA Laboratories, Inc. certifies that the above instrument has been calibrated with standards traceable to the National Institute of Standards and Technology, or have been derived from accepted values of natural physical constants, or have been derived by the ratio-type of calibration techniques.

Calibrated by: Kurt D. Newton

Date 27 MAR 2002

Reviewed by: Jay R. Dockendorff

Date 27 MAR 2002



RSA Laboratories ID# 6212.

Calibrated by: Kurt D. Newton [Signature] Date 18 JUL 2002  
 Reviewed by: Jay R. Dockendorff [Signature] Date 18 JUL 2002

# CERTIFICATE OF CALIBRATION (COUNTER/SCALER)



**RSA Laboratories, Inc.**

19 Pendleton Drive, P.O. Box 61

Hebron, Connecticut 06248

(203) 228-0721 Fax (203) 228-4402

Customer and Contact: Radiation Safety Associates, Inc. Attn: K. Paul Steinmeyer (860) 228-0487

Customer Address: P.O. Box 107, 19 Pendleton Drive, Hebron, CT 06248

Inst. Mfr. & Model Ludlum Model 2224

Inst. Type Scaler Ratemeter

Inst. s/n 119803

Det. Mfr. & Model Ludlum Model 43-89

Det. Type Alpha/Beta Scintillator

Det. s/n 132120

Cal. Date 18 July 2002

Due Date 18 January 2003

Cal. Interval 6 months

Environmental conditions: Temperature: 70°F Relative Humidity 50% Atmospheric Pressure 29.32 inches Hg

Pre-calibration Checks:

■ Contamination survey

■ Battery check

□ Slow response check

■ Det. volts 600 Vdc

■ Mechanical check

■ Audio check

■ Window operation

■ Meter zero

■ Reset check

■ Plateau check

■ Geotropism check

□ Fast response check

□ Alarm set

■ Input sens. \*See comments

■ Pulse generator s/n 94926

□ Oscilloscope s/n 171-04928

■ Voltmeter s/n 57410002

■ HV Readout (2 points) Ref./Inst. 500 V/500 V Ref./Inst. 1000 V/ 1000 V

Comments: \*Alpha threshold = 120 mV; Beta threshold = 2.6 mV; Beta window = 2.6 mV to 24 mV. Local background ≈ 1 cpm α, 600 cpm β. Efficiency determined with source in contact with detector window.

S/N of source used for precision check #6

Isotope Cs-137

Dedicated Source? ☐ Yes ☒ No

Reading #1 80,000 cpm

Reading #2 80,000 cpm

Reading #3 80,000 cpm

Mean 80,000 cpm

Precision: ☒ ± < 10% ☐ ± 10-20% ☐ Out of tolerance

Range Multiplier	Reference Calibration Point	Instrument Indication
x 1K	400,000 cpm	400,000 cpm
x 1K	100,000 cpm	100,000 cpm
x 100	40,000 cpm	40,000 cpm
x 100	10,000 cpm	10,000 cpm
x 10	4,000 cpm	4,000 cpm
x 10	1,000 cpm	1,000 cpm
x 1	400 cpm	400 cpm
x 1	100 cpm	100 cpm
1 min. x 1	5,000 cpm (5,000 counts)	4,997 counts

All ranges calibrated electronically.

Range Multiplier	Cal. Source Used (isotope and S/N)	Source Activity (dpm)	Instrument Reading (cpm)	4σ Instrument Efficiency (%)
1 min. count	C-14 #4456	202,100	3 (α) 7,067 (β)	0.00% 3.2%
1 min. count	Pm-147 #5381	14,433	3 (α) 1,452 (β)	0.00% 5.9%
1 min. count	Tc-99 #D702	23,064	1 (α) 3,760 (β)	0.00% 13.7%
1 min. count	Cs-137 #2886	19,037	2 (α) 5,435 (β)	0.00% 25.4%
1 min. count	Cl-36 #D700	23,598	2 (α) 7,160 (β)	0.00% 27.8%
1 min. count	Sr/Y-90 #D711	47,816	1 (α) 14,371 (β)	0.00% 28.8%
1 min. count	Th-230 #91TH2200210	38,900	6,901 (α) 2,000 (β)	17.7% 3.6%

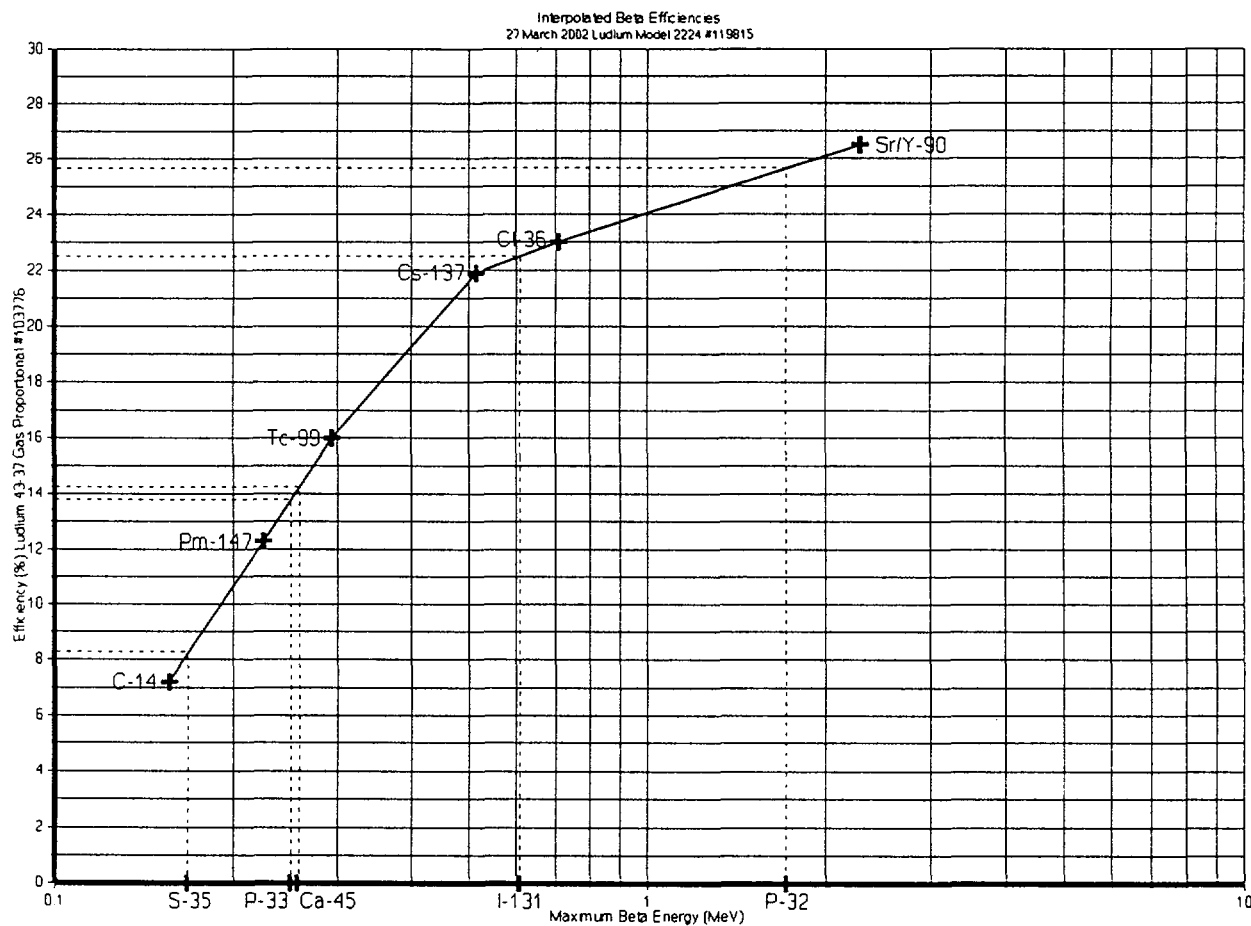
RSA Laboratories ID# 6212. Instrument indicates within ±10% of calibration points unless otherwise indicated. Source-to-detector entry window distance for efficiency determinations is 1 cm unless otherwise specified. RSA Laboratories, Inc. certifies that the above instrument has been calibrated with standards traceable to the National Institute of Standards and Technology, or have been derived from accepted values of natural physical constants, or have been derived by the ratio-type of calibration techniques.

Calibrated by: Kurt D. Newton

Date 18 JUL 2002

Reviewed by: Jay R. Dockendorf

Date 18 JUL 2002



RSA Laboratories ID# 5678.

Calibrated by: Kurt D. Newton [Signature] Date 27 MAR 2002  
 Reviewed by: Jay R. Dockendorff [Signature] Date 27 MAR 2002



# CERTIFICATE OF CALIBRATION (COUNT-RATE INSTRUMENT)



**RSA Laboratories, Inc.**

21 Pendleton Drive, P.O. Box 61  
Hebron, Connecticut 06248  
(860) 228-0721 Fax (860) 228-4402

Customer and Contact: Radiation Safety Associates, Inc. Attn: K. Paul Steinmeyer (860) 228-0487

Customer Address: P.O. Box 107, 19 Pendleton Drive, Hebron, CT 06248

Inst. Mfr. & Model Ludlum Model 2224-1

Inst. Type Scaler/Ratemeter

Inst. s/n 129459

Det. Mfr. & Model Ludlum 43-37 (Floor Mon.)

Det. Type Gas-Proportional

Det. s/n 128615

Cal. Date 22 July 2003

Due Date 22 January 2004

Cal. Interval 6 months

Environmental conditions: Temperature: 72°F Relative Humidity 50% Atmospheric Pressure 29.18 inches Hg

Pre-calibration Checks:

■ Contamination survey

■ Battery check

□ Slow response check

■ Det. volts 1600 Vdc

■ Mechanical check

■ Audio check

■ Window operation

■ Meter zero

■ Reset check

■ Plateau check

■ Geotropism check

□ Fast response check

□ Alarm set

■ Input sens. \*See comments

■ Pulse generator s/n 94926

□ Oscilloscope s/n 171-04928

■ Voltmeter s/n 57410002

■ HV Readout (2 points) Ref./Inst. 900 V/ 900 V Ref./Inst. 1700 V/ 1700 V

Comments: \* Alpha threshold = 70 mV; Beta threshold = 4 mV; Beta window = 4 mV to 30 mV. Unit calibrated as floor monitor, Ludlum 239-1F #161374. Local background = 11 cpm alpha, 680 cpm beta. Efficiencies measured with source in contact with probe face.

S/N of source used for precision check #6

Isotope Cs-137

Dedicated Source? □Yes ■No

Reading #1 21,000 cpm

Reading #2 23,000 cpm

Reading #3 22,000 cpm

Mean 22,000 cpm

Precision: ■± < 10% □± 10-20% □Out of tolerance

Range Multiplier	Reference Calibration Point	Instrument Indication
x 1000	400,000 cpm	400,000 cpm
x 1000	100,000 cpm	100,000 cpm
x 100	40,000 cpm	40,000 cpm
x 100	10,000 cpm	10,000 cpm
x 10	4000 cpm	4000 cpm
x 10	1000 cpm	1000 cpm
x 1	400 cpm	400 cpm
x 1	100 cpm	100 cpm
1 min count	100,000 cpm	99,828 cpm
1 min count	400,000 cpm	399,808 cpm

All ranges calibrated electronically.

Range Multiplier	Cal. Source Used (isotope and S/N)	Source Activity (dpm)	Instrument Reading (cpm)	4σ Instrument Efficiency (%)
1 min. count	C-14 #4456	202,100	10 (a) 14,764 (B)	0.00% 7.0%
1 min. count	Pm-147 #5381	11,561	13 (a) 1,720 (B)	0.02% 9.1%
1 min. count	Tc-99 #D702	23,064	10 (a) 3,633 (B)	0.00% 12.0%
1 min. count	Cs-137 #2806	18,267	10 (a) 3,229 (B)	0.00% 14.0%
1 min. count	Cs-136 #D700	23,590	13 (a) 3,418 (B)	0.01% 10.0%
1 min. count	Sr/Y-90 #D711	45,794	12 (a) 5,971 (B)	0.00% 11.3%
1 min. count	Tb-230 #91TE/700001 (47mm dia. check source)	33,000	6,452 (a) 2,096 (B)	19.5% 4.3%

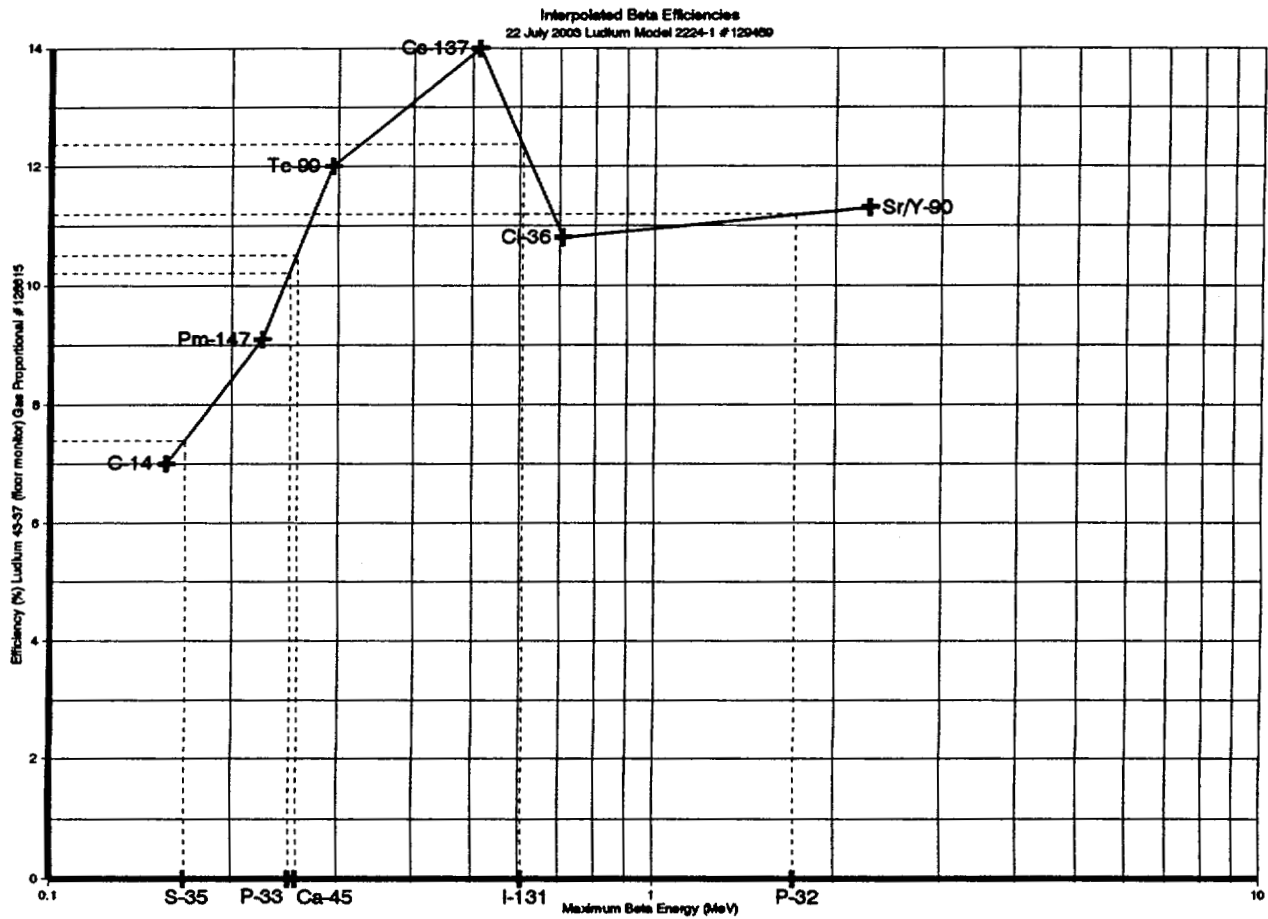
RSA Laboratories ID# 7683. Instrument indicates within ±10% of calibration points unless otherwise indicated. Source-to-detector entry window distance for efficiency determinations is 1 cm unless otherwise specified. RSA Laboratories, Inc. certifies that the above instrument has been calibrated with standards traceable to the National Institute of Standards and Technology, or have been derived from accepted values of natural physical constants, or have been derived by the ratio-type of calibration techniques.

Calibrated by: Kurt D. Newton

Date 22 JUL 2003

Reviewed by: Jay R. Dockendorff

Date 22 JUL 2003



RSA Laboratories ID# 7683.

Calibrated by: Kurt D. Newton

Date

22 JUL 2003

Reviewed by: Jay R. Dockendorff

Date

22 JUL 2003

# CERTIFICATE OF CALIBRATION (EXPOSURE RATE INSTRUMENT)



**RSA Laboratories, Inc.**

21 Pendleton Drive, P.O. Box 61

Hebron, Connecticut 06248

(860) 228-0721 Fax (860) 228-4402

Customer and Contact: Radiation Safety Associates, Inc. Attn: K Paul Steinmeyer (860) 228-0487

Customer Address: 19 Pendleton Drive, Hebron, CT 06248

Inst. Mfr. & Model Bicron Micro Rem LE

Inst. Type Survey Meter

Inst. s/n B768U

Det. Mfr. & Model (internal)

Type Organic Scintillator

Det. s/n N/A

Cal. Date 15 April 2003

Due Date 15 April 2004

Cal. Interval 1 year

Environmental conditions: Temperature: 72°F Relative Humidity 25% Atmospheric Pressure 29.10 inches Hg

Pre-calibration Checks:

■ Contamination survey

■ Battery check

□ Slow response check

■ Mechanical check

□ Audio check

□ Window operation

□ Det. volts

■ Meter zero

■ Reset check

□ Plateau check

■ Geotropism check

□ Fast response check

□ Alarm set

□ Input sens.

■ Pulse generator s/n 94926

□ Oscilloscope s/n 171-04928

■ Voltmeter s/n 57410002

□ HV Readout (2 points) Ref./Inst.

V/

V

Ref./Inst.

V/

V

Comments:

S/N of source used for precision check #6

Isotope Cs-137

Dedicated Source? ☐ Yes ☒ No

Reading #1 4500  $\mu\text{rem/h}$

Reading #2 4500  $\mu\text{rem/h}$

Reading #3 4500  $\mu\text{rem/h}$

Mean 4500  $\mu\text{rem/h}$

Precision: ☒  $\pm < 10\%$  ☐  $\pm 10-20\%$  ☐ Out of tolerance

Range	Reference Calibration Point	Instrument Indication
x 1000	143,021 $\mu\text{R/h}$	140,000 $\mu\text{rem/h}$
x 1000	34,961 $\mu\text{R/h}$	35,000 $\mu\text{rem/h}$
x 100	14,699 $\mu\text{R/h}$	15,000 $\mu\text{rem/h}$
x 100	3,576 $\mu\text{R/h}$	3,500 $\mu\text{rem/h}$
x 10	1,470 $\mu\text{R/h}$	1,500 $\mu\text{rem/h}$
x 10	429 $\mu\text{R/h}$	450 $\mu\text{rem/h}$
x 1	147 $\mu\text{R/h}$	145 $\mu\text{rem/h}$
x 1	45 $\mu\text{R/h}$	45 $\mu\text{rem/h}$
x 1	16,000 cpm @ 800 mV	160 $\mu\text{rem/h}$
x 1	4,000 cpm @ 800 mV	40 $\mu\text{rem/h}$
x 0.1	1,600 cpm @ 800 mV	16 $\mu\text{rem/h}$
x 0.1	400 cpm @ 800 mV	4 $\mu\text{rem/h}$

x 0.1 range was calibrated electronically.

Sources used:  $^{137}\text{Cesium}$  750 mCi s/n KR-6244 and KR-6250, and  $^{137}\text{Cesium}$  750  $\mu\text{Ci}$  s/n 163.

RSA Laboratories Log ID# 7417. Calibration points calculated to center of detector volume unless otherwise specified. Instrument indicates within  $\pm 10\%$  of calibration points unless otherwise indicated. RSA Laboratories, Inc. certifies that the above instrument has been calibrated with standards traceable to the National Institute of Standards and Technology, or have been derived from accepted values of natural physical constants, or have been derived by the ratio-type of calibration techniques.

Calibrated by: Kurt D. Newton

Date

15 APR 2003

Reviewed by: Jay R. Dockendorff

Date

15 Apr 2003

# CERTIFICATE OF CALIBRATION (EXPOSURE RATE INSTRUMENT)



**RSA Laboratories, Inc.**

21 Pendleton Drive, P.O. Box 61  
Hebron, Connecticut 06248  
(860) 228-0721 Fax (860) 228-4402

Customer and Contact: Radiation Safety Associates, Inc. Attn: K Paul Steinmeyer (860) 228-0487

Customer Address: 19 Pendleton Drive, Hebron, CT 06248

Inst. Mfr. & Model Bicron Micro Rem LE

Inst. Type Survey Meter

Inst. s/n B768U

Det. Mfr. & Model (internal)

Type Organic Scintillator

Det. s/n N/A

Cal. Date 15 July 2002

Due Date 15 January 2003

Cal. Interval 6 months

Environmental conditions: Temperature: 73°F Relative Humidity 58% Atmospheric Pressure 29.22 inches Hg

Pre-calibration Checks:

☒ Contamination survey

☒ Battery check

☐ Slow response check

☒ Mechanical check

☐ Audio check

☐ Window operation

☐ Det. volts

☒ Meter zero

☒ Reset check

☐ Plateau check

☒ Geotropism check

☐ Fast response check

☐ Alarm set

☐ Input sens.

☒ Pulse generator s/n 94926

☒ Oscilloscope s/n 171-04928

☒ Voltmeter s/n 57410002

☐ HV Readout (2 points) Ref./Inst.

V/

V

Ref./Inst.

V/

V

Comments:

S/N of source used for precision check #6

Isotope Cs-137

Dedicated Source? ☐ Yes ☒ No

Reading #1 4500  $\mu\text{rem/h}$

Reading #2 4500  $\mu\text{rem/h}$

Reading #3 4500  $\mu\text{rem/h}$

Mean 4500  $\mu\text{rem/h}$

Precision: ☒  $\pm 10\%$  ☐  $\pm 10-20\%$  ☐ Out of tolerance

Range	Reference Calibration Point	Instrument Indication
x 1000	145,535 $\mu\text{R/h}$	140,000 $\mu\text{rem/h}$
x 1000	35,575 $\mu\text{R/h}$	35,000 $\mu\text{rem/h}$
x 100	14,958 $\mu\text{R/h}$	15,000 $\mu\text{rem/h}$
x 100	3,638 $\mu\text{R/h}$	3,500 $\mu\text{rem/h}$
x 10	1,496 $\mu\text{R/h}$	1,500 $\mu\text{rem/h}$
x 10	437 $\mu\text{R/h}$	450 $\mu\text{rem/h}$
x 1	150 $\mu\text{R/h}$	145 $\mu\text{rem/h}$
x 1	46 $\mu\text{R/h}$	45 $\mu\text{rem/h}$
x 1	16,000 cpm @ 800 mV	160 $\mu\text{rem/h}$
x 1	4,000 cpm @ 800 mV	40 $\mu\text{rem/h}$
x 0.1	1,600 cpm @ 800 mV	16 $\mu\text{rem/h}$
x 0.1	400 cpm @ 800 mV	4 $\mu\text{rem/h}$

x 0.1 range was calibrated electronically.

Sources used:  $^{137}\text{Cesium}$  750 mCi s/n KR-6244 and KR-6250, and  $^{137}\text{Cesium}$  750  $\mu\text{Ci}$  s/n 163.

RSA Laboratories Log ID# 6233. Calibration points calculated to center of detector volume unless otherwise specified. Instrument indicates within  $\pm 10\%$  of calibration points unless otherwise indicated. RSA Laboratories, Inc. certifies that the above instrument has been calibrated with standards traceable to the National Institute of Standards and Technology, or have been derived from accepted values of natural physical constants, or have been derived by the ratio-type of calibration techniques.

Calibrated by: Kurt D. Newton

Date 15 JUL 2002

Reviewed by: Jay R. Dockendorff

Date 15 JUL 2002

# **ATTACHMENT B**

## **MDA Calculations**



## DIRECT MEASUREMENT DETECTION LIMITS--SURFACE CONTAMINATION

Minimum detectable activity (MDA) for the portable survey instruments listed below is calculated as follows, in accordance with MARSSIM.

$$MDA = \frac{3 + 2k_1 \sqrt{R_b t_s \left(1 + \frac{t_s}{t_b}\right)}}{(t_s)(E)(C)}$$

where:

$R_b$  = background count rate in cpm

$t_s$  = sample count time in minutes

$t_b$  = background count time in minutes

E = detector efficiency in counts per disintegration

C = conversion factor from dpm to other desired activity unit, if applicable

$k_1$  = 1.645 at 95%CL

$R_b$  = see below

$t_s$  = see below

$t_b$  = see below

**Table 1. Portable Instrumentation for Radiological Surveys**

Type of Measurement	Instrumentation		$R_b$ cpm	$t_b$ minutes	$t_s$ minutes	4 $\pi$ Eff. %	MDA dpm/100 cm <sup>2</sup>
	Detector	Instrument					
Alpha Surface scan and Activity	Thin-window Alpha/beta Scintillator Ludlum Model 43-89 (126 cm <sup>2</sup> ) SN: 132120 Cal Date: 7/18/02	Scaler-rate meter Ludlum Model 2224 SN: 119803 Cal Date: 7/18/02	$\alpha$ = 2.5	10	5	17.7% $\alpha$ (Th-230)	15.5 activity 105 scan
Alpha-Beta Surface scan and Activity	Thin-window gas proportional detector, Ludlum Model 43-37 584 cm <sup>2</sup> Floor Monitor SN: 128615 Cal Date: 7/22/03	Scaler-rate meter Ludlum Model 2224 SN: 129459 Cal Date: 7/22/03	$\alpha$ = 4.5 $\beta$ = 159	15	5	19.5% $\alpha$ (Th-230) 14% $\beta$ (Cs-137)	3.7 $\alpha$ activity 26.9 $\beta$ activity 24.6 $\alpha$ scan 143 $\beta$ scan
Alpha Surface scan and Activity	Thin-window gas proportional detector, Ludlum Model 43-37 584 cm <sup>2</sup> Floor Monitor SN: 103776 Cal Date: 3/27/02	Scaler-rate meter Ludlum Model 2224 SN: 119815 Cal Date: 3/27/02	$\alpha$ = 5.4	5	1	15% $\alpha$ (Th-230)	13 $\alpha$ activity 34 $\alpha$ scan
Dose Rate Survey	Internal Organic Scintillator	Bicron Micro Rem SN: B768U Cal Date: 7/15/02 Cal Date: 4/15/03	6 $\mu$ rem/h	--	--	Cs-137 $\pm$ 10% of true	N/A



## SCANNING DETECTION LIMITS--SURFACE CONTAMINATION

### **Ludlum Model 43-89 (s/n 132120) / Ludlum Model 2224 (s/n 119803) Alpha Scan MDA**

Background Count = 2.5 cpm  
Instrument used: Lud Mod 2224 on fast response  
Time Constant = 9 seconds  
Background and Sample Counting Time = 0.3 minutes  
Detector used: Lud Mod 43-89  
Detector Efficiency = 0.177 counts per disintegration  
Detector Area = 126 cm<sup>2</sup>  
Critical Level (Lc) = 6.716 cpm above bkgd.  
Detection Limit (Ld) = 23.43 cpm above bkgd.  
Minimum Detectable Activity (MDA) = 132.4 dpm/detector  
Minimum Detectable Activity (MDA) = 105.1 dpm/100 cm<sup>2</sup>

Ludlum Model 43-89  
Alpha-Beta Scintillator

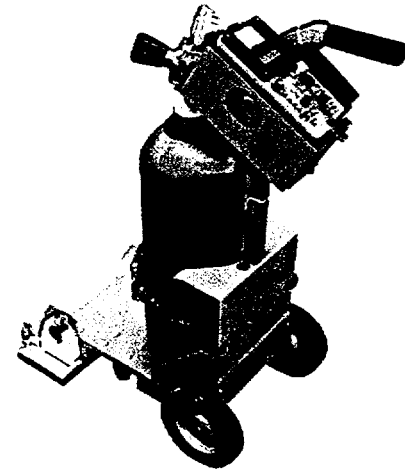


### **Ludlum Model 43-37 (s/n 128615) / Ludlum Model 2224 (s/n 129459) Alpha Scan MDA**

Background Count = 4.5 cpm  
Instrument used: Lud Mod 2224 on fast response  
Time Constant = 9 seconds  
Background and Sample Counting Time = 0.3 minutes  
Detector used: Lud Mod 43-37  
Detector Efficiency = 0.195 counts per disintegration  
Detector Area = 584 cm<sup>2</sup>  
Critical Level (Lc) = 9.01 cpm above bkgd.  
Detection Limit (Ld) = 28.02 cpm above bkgd.  
Minimum Detectable Activity (MDA) = 143.7 dpm/detector  
Minimum Detectable Activity (MDA) = 24.6 dpm/100 cm<sup>2</sup>

### **Ludlum Model 43-37 (s/n 128615) / Ludlum Model 2224 (s/n 129459) Beta Scan MDA**

Background Count = 159 cpm  
Instrument used: Lud Mod 2224 on fast response  
Time Constant = 9 seconds  
Background and Sample Counting Time = 0.3 minutes  
Detector used: Lud Mod 43-37  
Detector Efficiency = 0.14 counts per disintegration  
Detector Area = 584 cm<sup>2</sup>  
Critical Level (Lc) = 53.56 cpm above bkgd.  
Detection Limit (Ld) = 117.1 cpm above bkgd.  
Minimum Detectable Activity (MDA) = 836.5 dpm/detector  
Minimum Detectable Activity (MDA) = 143.2 dpm/100 cm<sup>2</sup>

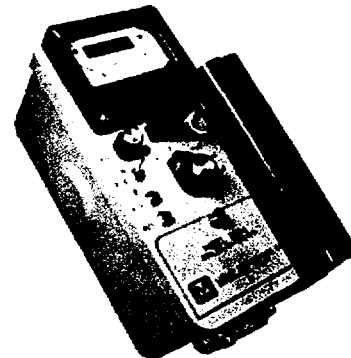


Ludlum Floor Monitor 239-1F (Model 43-37  
Detector and Model 2224 Scaler-Ratemeter).

### **Ludlum Model 43-37 (s/n 103776) / Ludlum Model 2224 (s/n 119815) Alpha Scan MDA**

Background Count = 5.4 cpm  
Instrument used: Lud Mod 2224 on fast response  
Time Constant = 9 seconds  
Background and Sample Counting Time = 0.3 minutes  
Detector used: Lud Mod 43-37  
Detector Efficiency = 0.15 counts per disintegration  
Detector Area = 584 cm<sup>2</sup>  
Critical Level (Lc) = 9.87 cpm above bkgd.  
Detection Limit (Ld) = 29.74 cpm above bkgd.  
Minimum Detectable Activity (MDA) = 198.3 dpm/detector  
Minimum Detectable Activity (MDA) = 33.95 dpm/100 cm<sup>2</sup>

Ludlum 2221 Scaler-Ratemeter.



(All values calculated to 95% CL via MARSSIM methods.)



## Protean Gas Proportional Wipe Counter

### DETECTION LIMITS

Lower limit of detection (LLD) is calculated for the Protean Instruments Corporation Low-background gas-proportional counter using the equation below.

$$LLD = \frac{3 + 2 k_1 \sqrt{R_b t_s \left( 1 + \frac{t_s}{t_b} \right)}}{(t_s)(E) \left( \frac{A}{100} \right)(C)}$$

where:

$R_b$  = background count rate in cpm

$t_s$  = sample count time in minutes

$t_b$  = background count time in minutes

$E$  = detector efficiency in counts per disintegration

$A$  = area wiped

$C$  = conversion factor from dpm to other desired activity unit, if applicable

$k_1$  = 1.645 at 95%CL

$R_b$  = see below

$t_s$  = 10 minutes

$t_b$  = 300 minutes

**Table 2. Analytical Instrument for Radiological Surveys**

Type of Measurement	Instrumentation		$R_b$ cpm	$t_b$ minutes	$t_s$ minutes	4 $\pi$ Eff.	MDA dpm/100 cm <sup>2</sup>
	Detector	Instrument					
Gas proportional 100 cm <sup>2</sup> wipes	Internal	Protean	9-20-02 $\alpha$ = 0.190 $\beta$ = 1.62	300	10	$\alpha$ = 31.38% $\beta$ = 47.97%	$\alpha$ = 2.4 $\beta$ = 3.4
Gas proportional 600 cm <sup>2</sup> wipes	Internal	Protean	9-22-03 $\alpha$ = 0.13 $\beta$ = 1.78	300	10	$\alpha$ = 31.38% $\beta$ = 47.97%	$\alpha$ = 0.36 $\beta$ = 0.6

#### Alpha LLD 100 cm<sup>2</sup> Wipes (9-20-02)

Background Count = 0.19 cpm

Background Counting Time = 300 minutes

Sample Counting Time = 10 minutes

Detector Efficiency = 0.3138 counts per disintegration

Detector Area = 100 cm<sup>2</sup>

Critical Level ( $L_c$ ) = 0.2305 cpm above bkgd.

Detection Limit ( $L_d$ ) = 0.761 cpm above bkgd.

Minimum Detectable Activity (MDA) = 2.425 dpm/wipe

Minimum Detectable Activity (MDA) = 2.425 dpm/100 cm<sup>2</sup>

#### Beta LLD 100 cm<sup>2</sup> Wipes (9-20-02)

Background Count = 1.62 cpm

Background Counting Time = 300 minutes

Sample Counting Time = 10 minutes

Detector Efficiency = 0.4797 counts per disintegration

Detector Area = 100 cm<sup>2</sup>

Critical Level ( $L_c$ ) = 0.673 cpm above bkgd.

Detection Limit ( $L_d$ ) = 1.646 cpm above bkgd.

Minimum Detectable Activity (MDA) = 3.431 dpm/wipe

Minimum Detectable Activity (MDA) = 3.431 dpm/100 cm<sup>2</sup>





**Alpha LLD 600 cm<sup>2</sup> Wipes (9-22-03)**

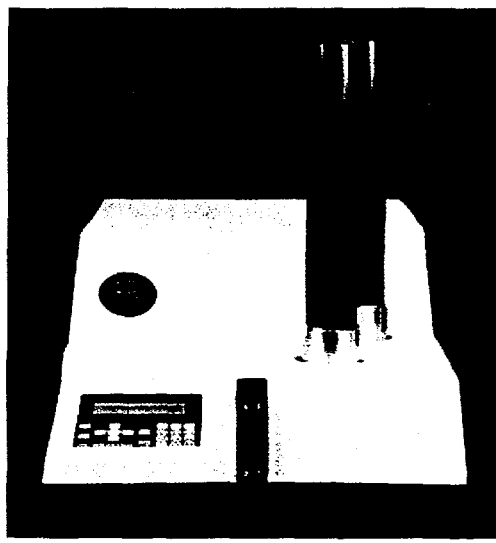
Background Count = 0.19 cpm  
Background Counting Time = 300 minutes  
Sample Counting Time = 10 minutes  
Detector Efficiency = 0.3138 counts per disintegration  
Detector Area = 600 cm<sup>2</sup>  
Critical Level (Lc) = 0.2305 cpm above bkgd.  
Detection Limit (Ld) = 0.761 cpm above bkgd.  
Minimum Detectable Activity (MDA) = 2.425 dpm/wipe  
Minimum Detectable Activity (MDA) = 0.4042 dpm/100 cm<sup>2</sup>

**Beta LLD 600 cm<sup>2</sup> Wipes (9-22-03)**

Background Count = 1.62 cpm  
Background Counting Time = 300 minutes  
Sample Counting Time = 10 minutes  
Detector Efficiency = 0.4797 counts per disintegration  
Detector Area = 600 cm<sup>2</sup>  
Critical Level (Lc) = 0.673 cpm above bkgd.  
Detection Limit (Ld) = 1.646 cpm above bkgd.  
Minimum Detectable Activity (MDA) = 3.431 dpm/wipe  
Minimum Detectable Activity (MDA) = 0.5719 dpm/100 cm<sup>2</sup>

All values calculated to 95% CL via MARSSIM methods

**Protean Instrument Corporation Low  
Background Gas Proportional Sample Counter**



# **ATTACHMENT C**

## **Survey Area Maps**



# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

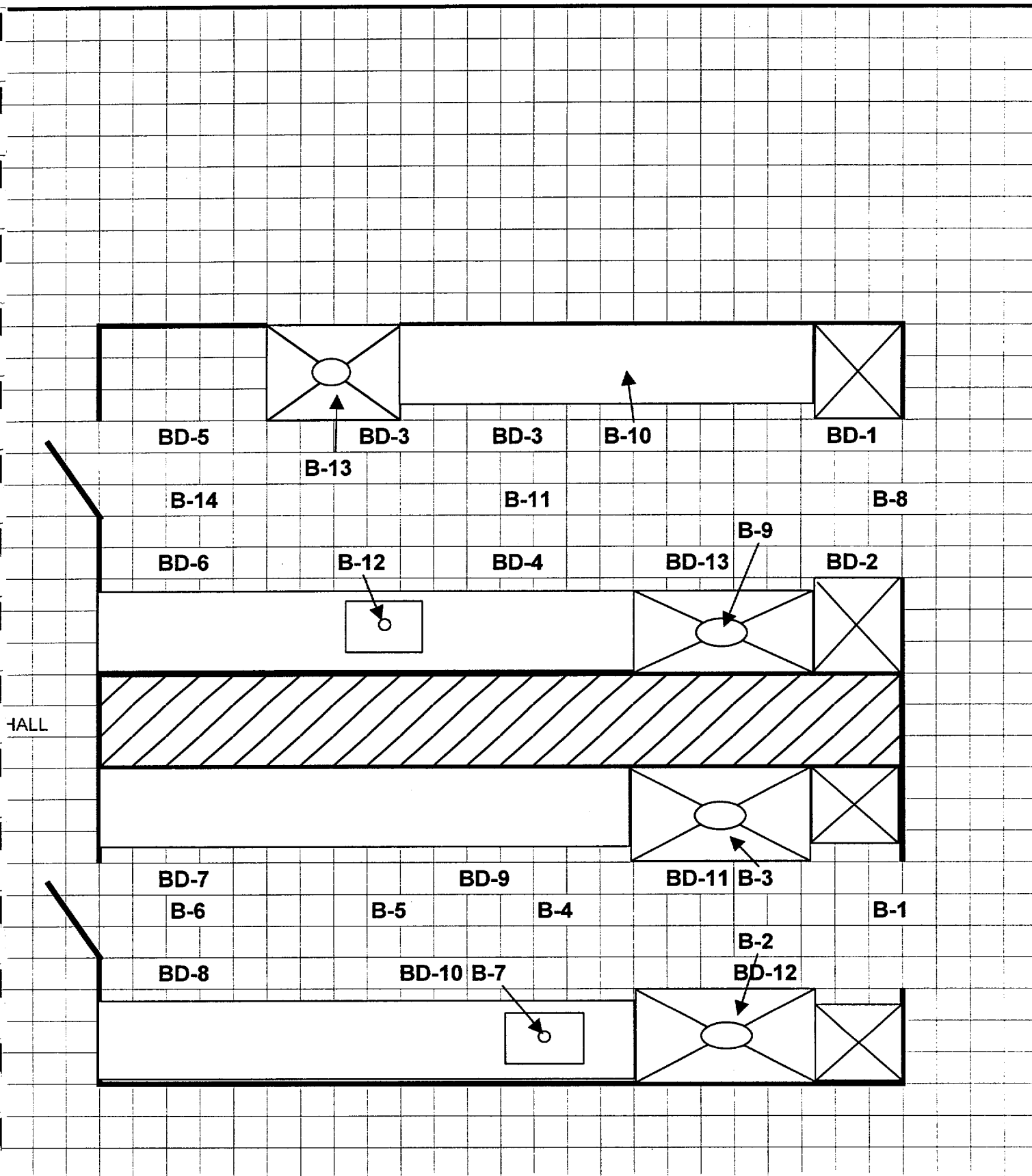
Job UTRC Final Status Survey

Direct Survey and Wipe locations

Location Room N263H and N265H Date 9/17/2003

Checked By *MM* Date 6/18/04

Scale: **Not to Scale**



# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive  
Hebron, CT 06248  
(860) 228-0487

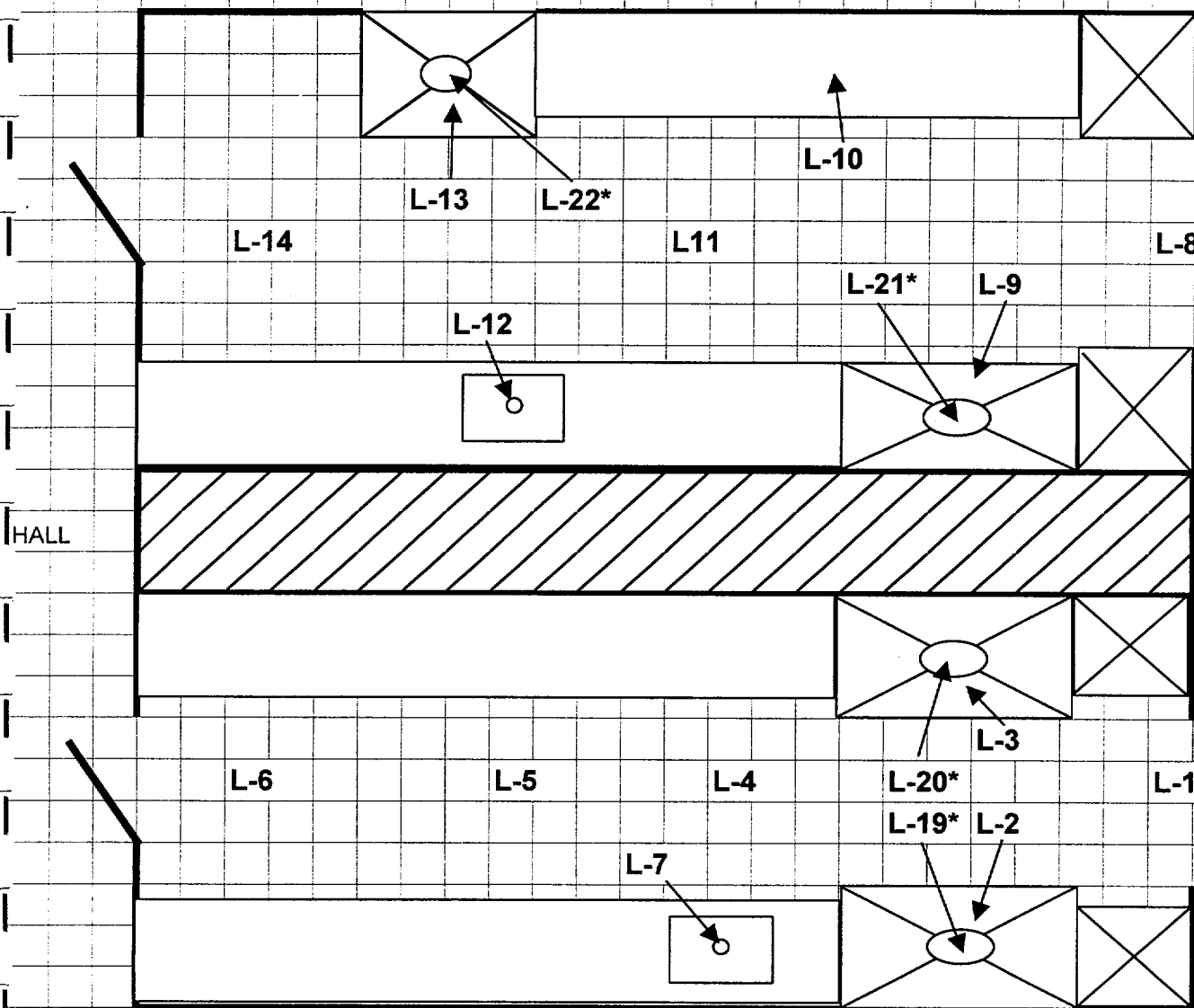
Job UTRC Final Status Survey

H-3, I-129 Wipe Locations

Location Room N263H and N265H Date 3/10/2004

Checked By [Signature] Date 6/18/04

Scale: Not to Scale



\* = Exhaust vent on Roof

# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

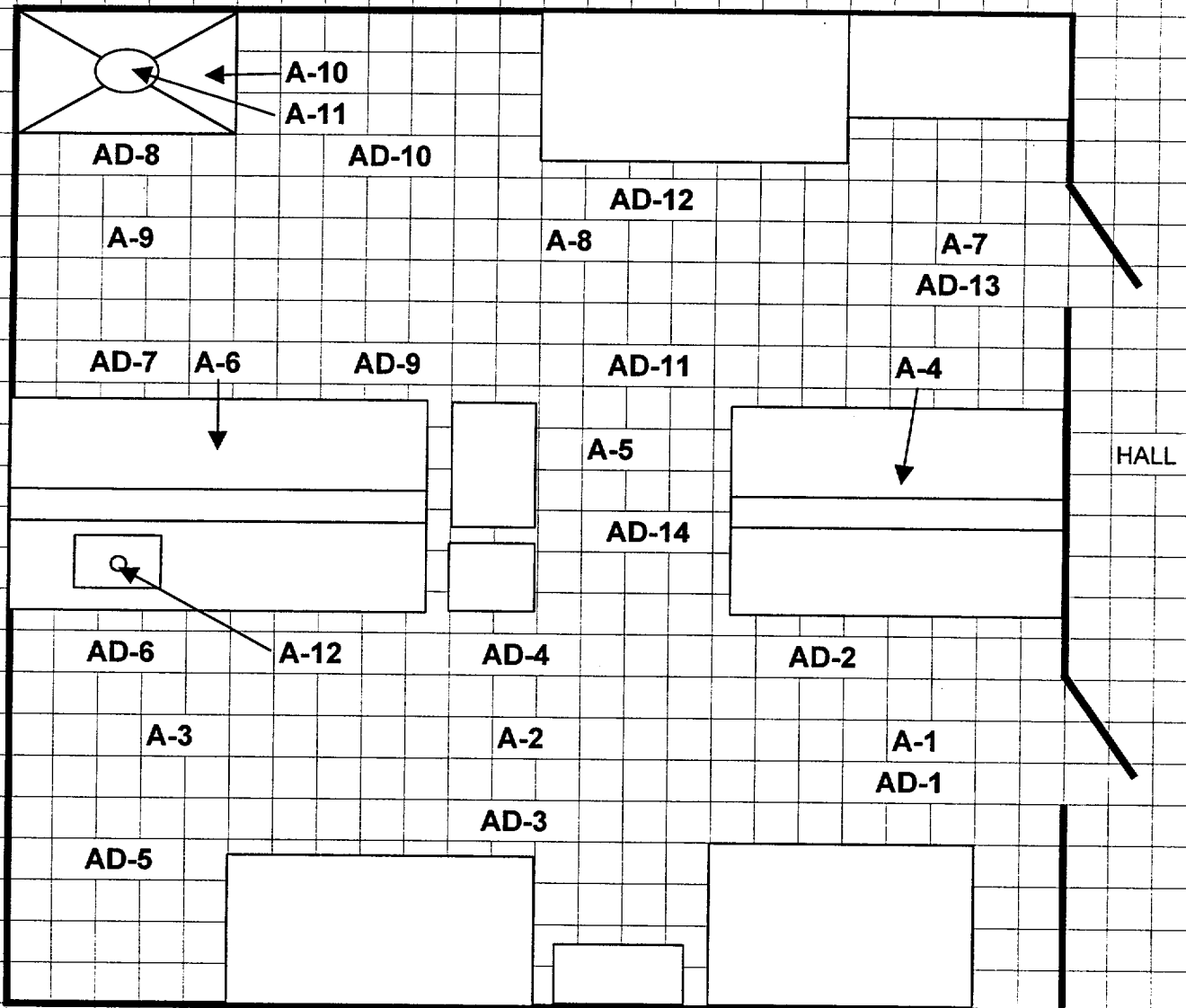
Job UTRC Final Status Survey

Direct Survey and Wipe locations

Location Room S263H and S265H Date 9/17/2003

Checked By KM Date 6/18/04

Scale: **Not to Scale**



# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

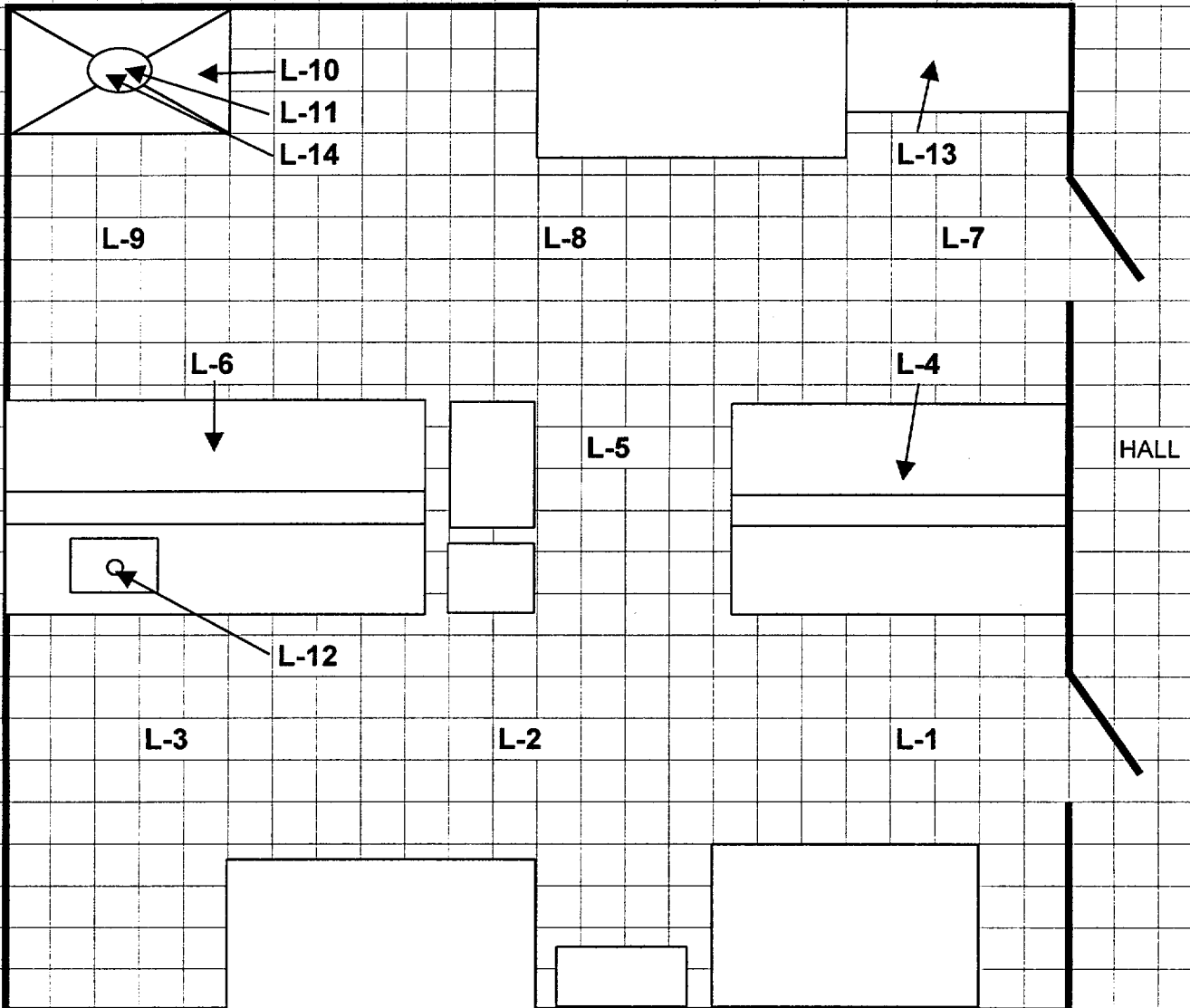
Job UTRC Final Status Survey

H-3, I-129 Wipe Locations

Location Room S263H and S265H Date 3/10/2004

Checked By *[Signature]* Date 6/18/04

Scale: Not to Scale



\* = Exhaust vent on Roof

# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

Job UTRC Final Status Survey

Direct Survey and Wipe locations

Location Hall Chem. Stor. Closet Date 9/17/2003

Checked By XH Date 6/18/04

Scale: **Not to Scale**

STORAGE CLOSET

A-15

A-16

A-13

BD1-4

A-14

HALL

# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

Job UTRC Final Status Survey

H-3, I-129 Wipe Locations

Location Hall Chem. Stor. Closet

Date 3/10/2004

Checked By MM

Date 4/18/04

Scale: Not to Scale

STORAGE CLOSET

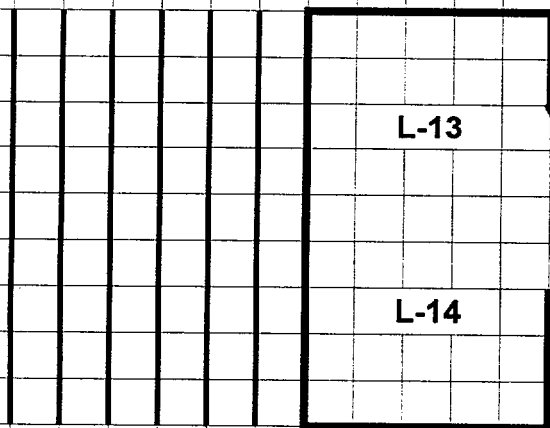
L-15

L-16

L-13

HALL

L-14





# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

Job UTRC Final Status Survey

Direct Survey and Wipe locations

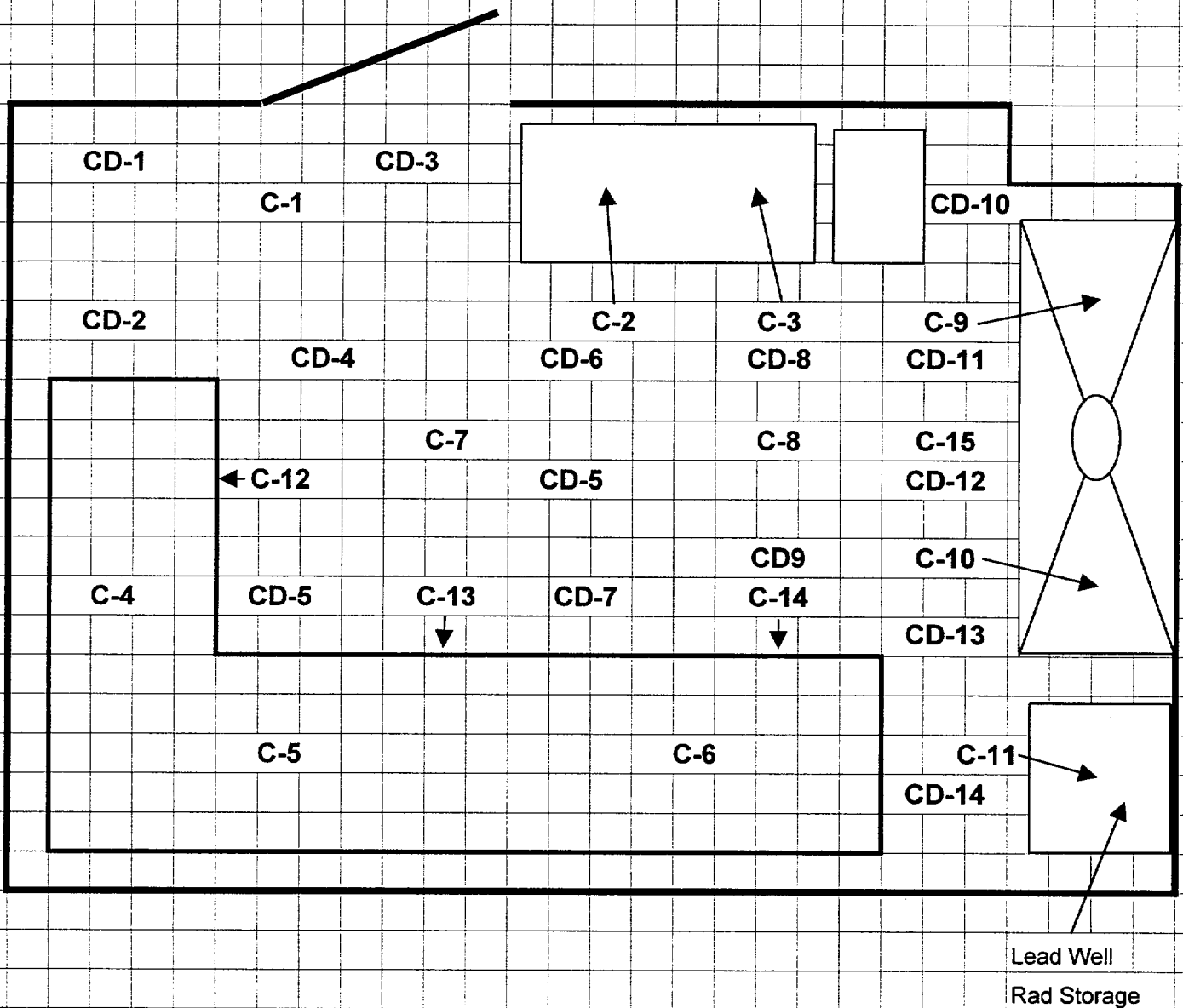
Location 129G Hot Lab

Date 9/17/2003

Checked By *XM*

Date 6/18/04

Scale: **Not to Scale**



Job **UTRC Final Status Survey**

### H-3, I-129 Wipe Locations

**RADIATION SAFETY ASSOCIATES**

19 Pendleton Drive

Hebron, CT 06248

**(860) 228-0487**

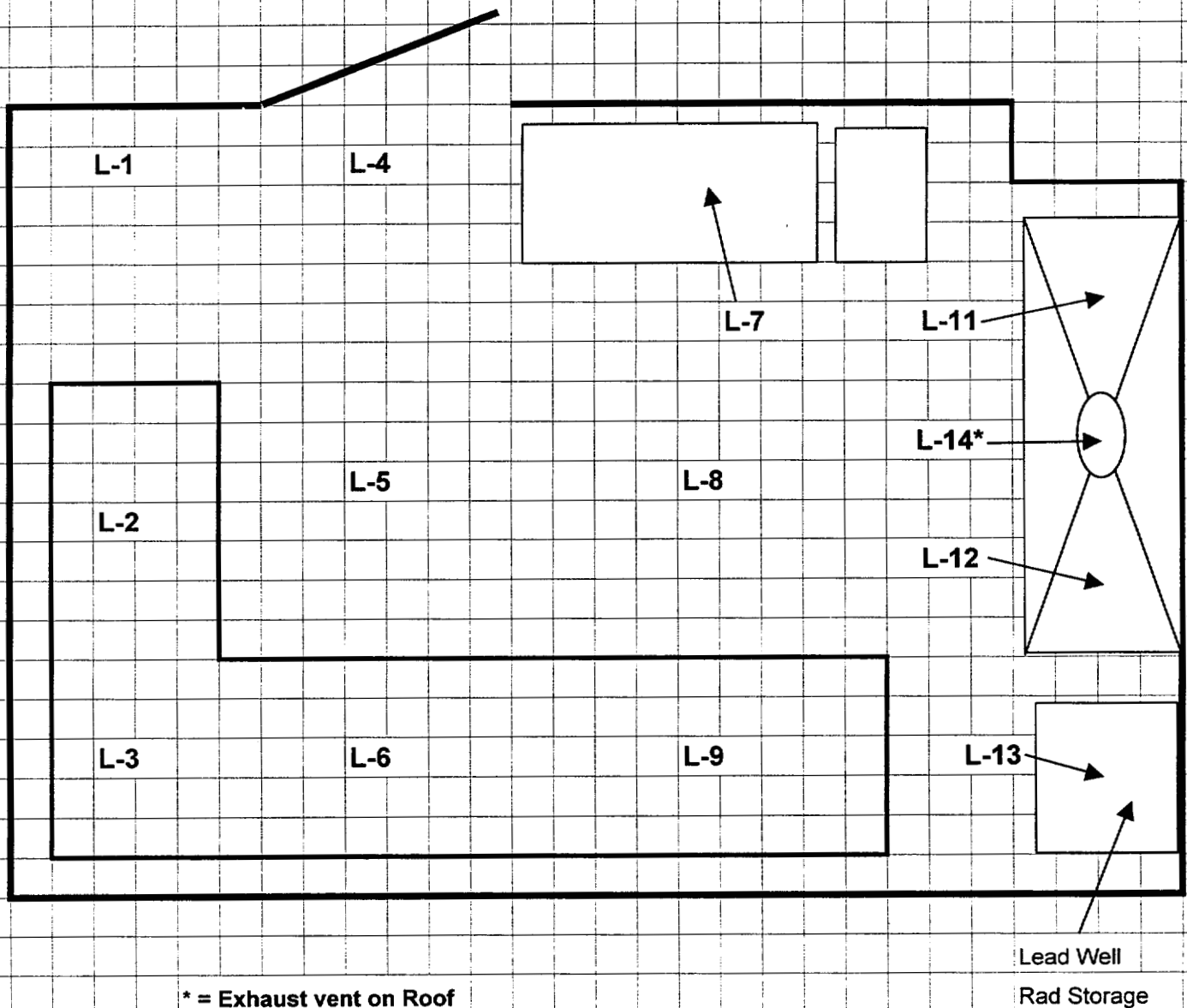
Location **129G Hot Lab,**

Date **3/10/2004**

Checked By                     

Date 6/18/07

Scale: **Not to Scale**



# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

Job UTRC Final Status Survey

Direct Survey and Wipe locations

Location Radioisotope Lab

Date 9/17/2003

Checked By AS

Date 6/18/04

Scale: Not to Scale

129G (Hot Lab)

DD-1

D-1

DD-2

D-2

DD-7

D-7

DD-3

D-3

DD-8

D-8

DD-4

D-4

DD-9

D-9

DD-5

D-5

DD-13

D-13

DD-11

D-11

DD-14

D-14

DD-12

D-12

DD-10

D-10

DD-6

D-6

**RADIATION SAFETY ASSOCIATES**

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

Job UTRC Final Status Survey

H-3, I-129 Wipe Locations

Location Radioisotope Lab

Date 3/10/2004

Checked By NA

Date 6/18/04

Scale: **Not to Scale**

129G (Hot Lab)

L-1

L-5

L-2

L-6

L-3

L-9

L-7

L-4

L-8

# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

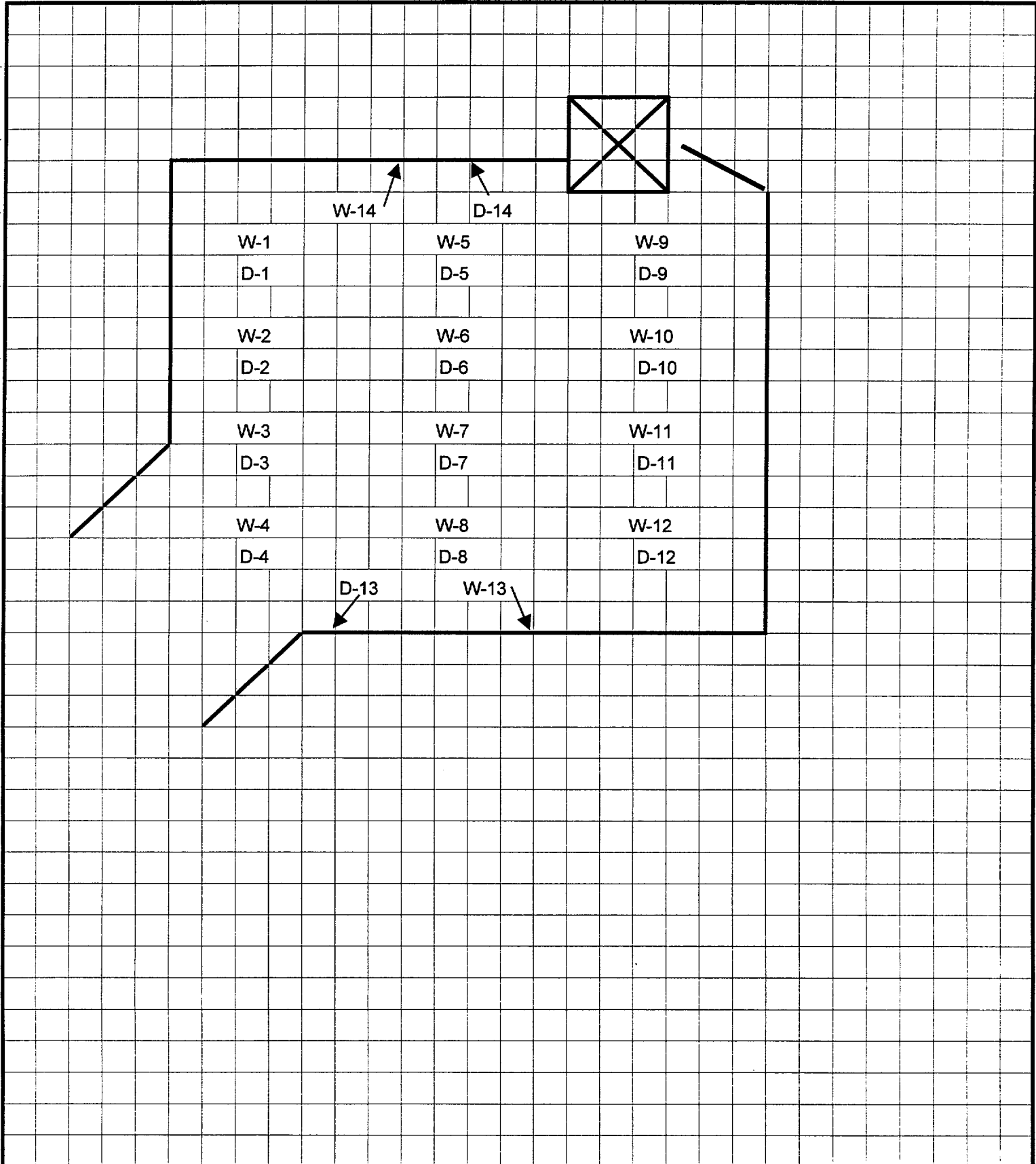
Job UTRC Final Status Survey

Direct Survey and Wipe locations

Location Stand 30A, Floors & Walls Date 8/1/2002

Checked By RA Date 6/18/02

Scale: Not to Scale



# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

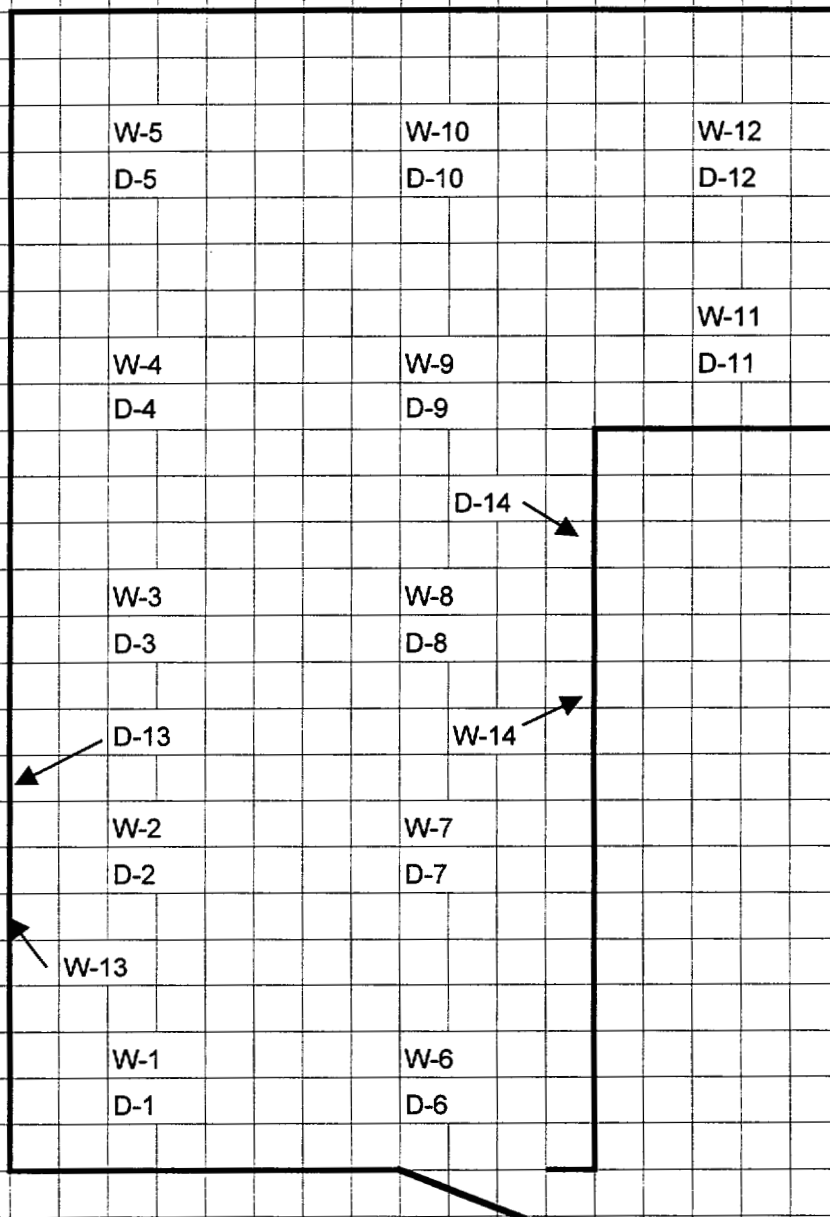
Job UTRC Final Status Survey

Direct Survey and Wipe locations

Location Stand 31 Floors & Walls Date 8/1/2002

Checked By RSI Date 6/18/02

Scale: Not to Scale



# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

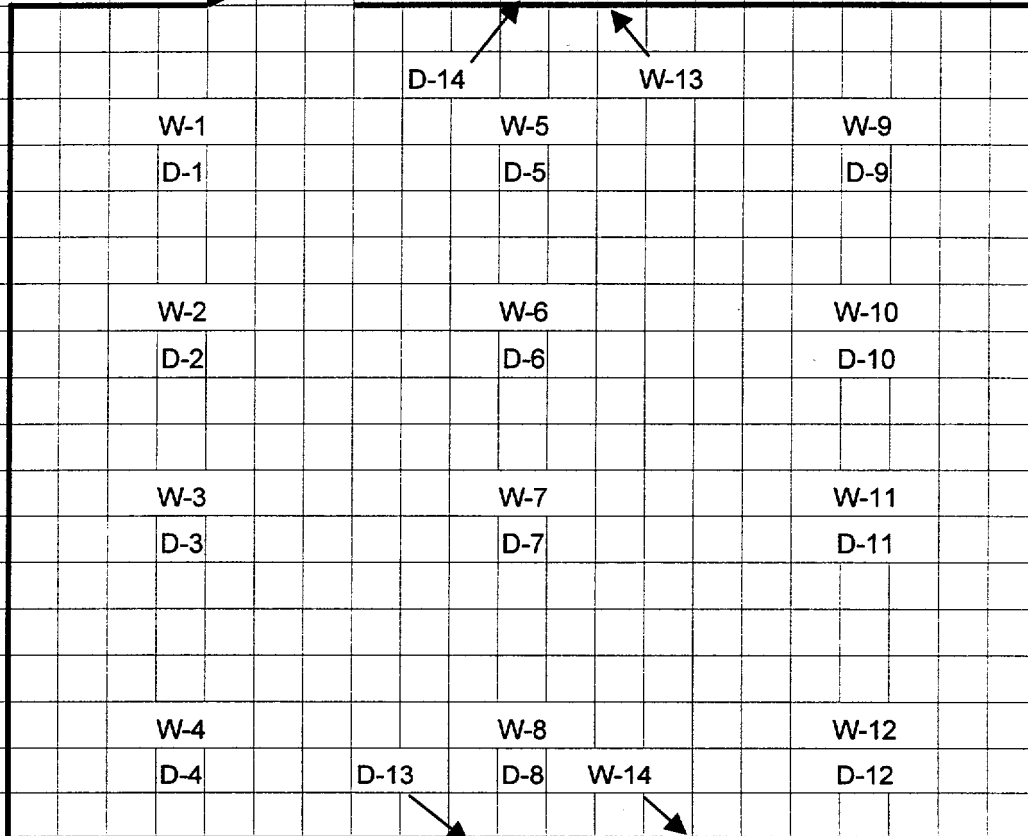
Job UTRC Final Status Survey

Direct Survey and Wipe locations

Location Stand 33 Floors & Walls Date 8/1/2002

Checked By RA Date 6/18/07

Scale: **Not to Scale**



# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

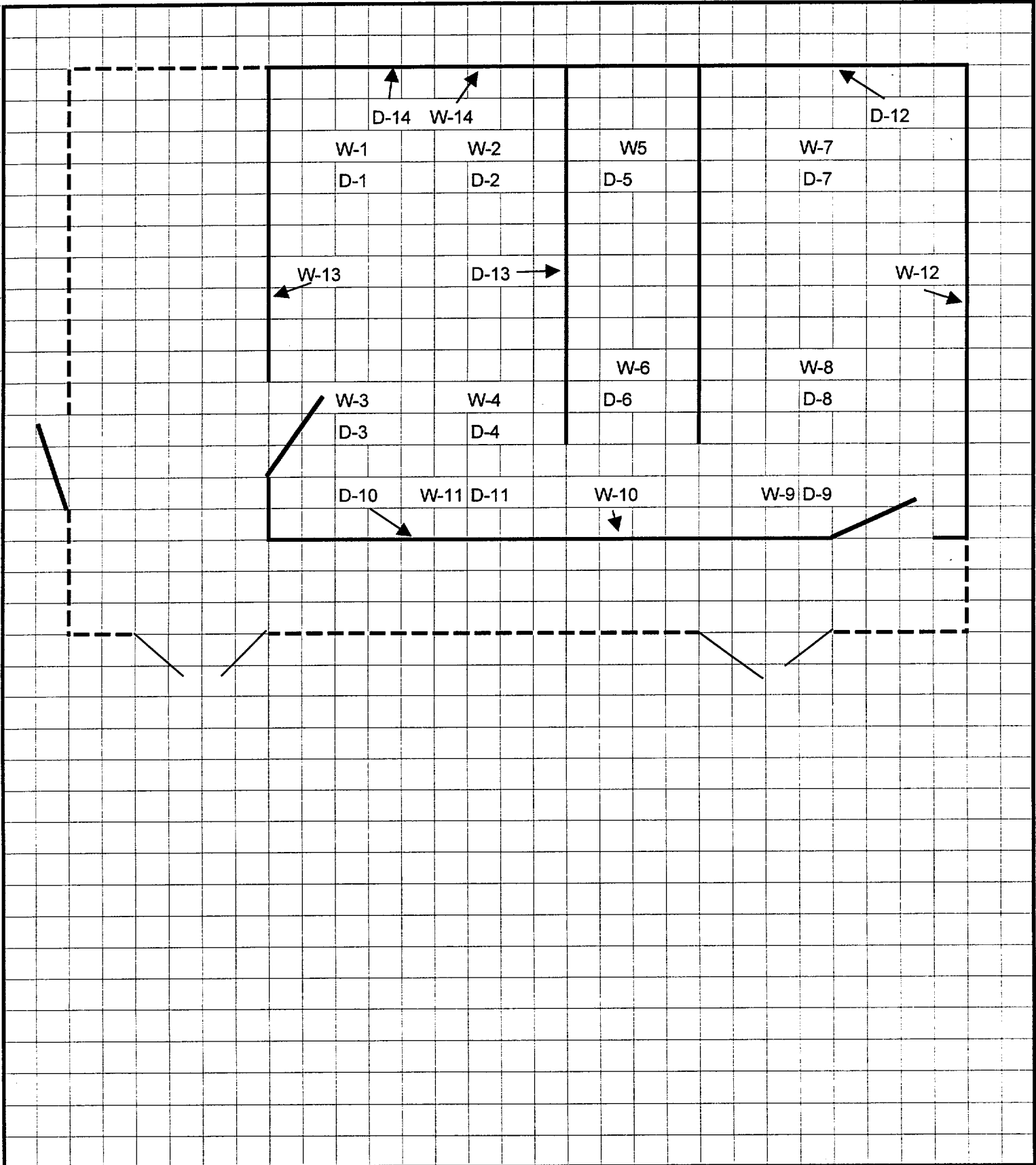
Job UTRC Final Status Survey

Direct Survey and Wipe locations

Location Stand 34 I Floors & Walls Date 8/1/2002

Checked By [Signature] Date 6/18/04

Scale: **Not to Scale**





# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

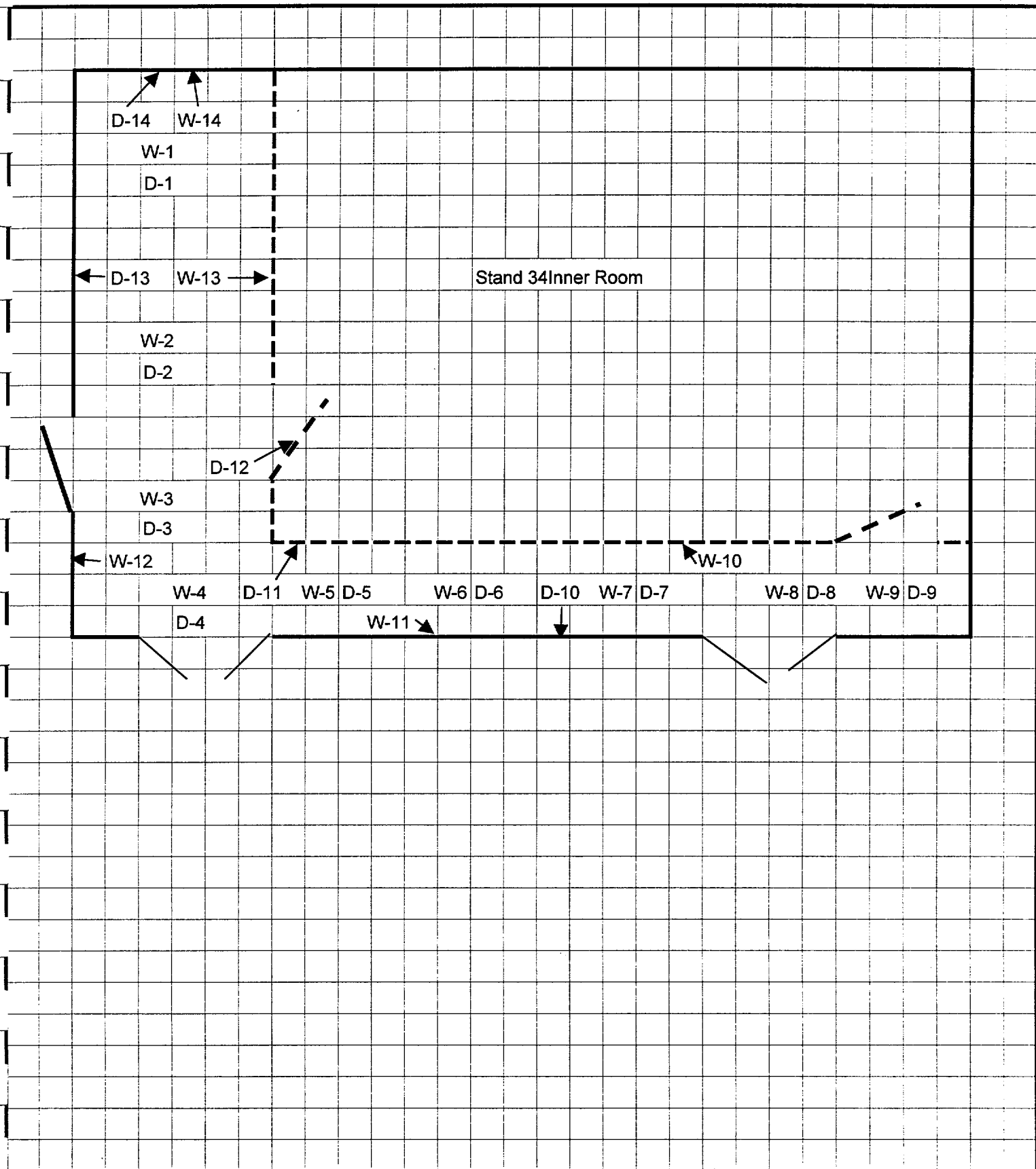
Job UTRC Final Status Survey

Direct Survey and Wipe locations

Location Stand 34 O Floors & Walls Date 8/1/2002

Checked By RCA Date 6/18/04

Scale: **Not to Scale**



# RADIATION SAFETY ASSOCIATES

19 Pendleton Drive

Hebron, CT 06248

(860) 228-0487

Job UTRC Final Status Survey

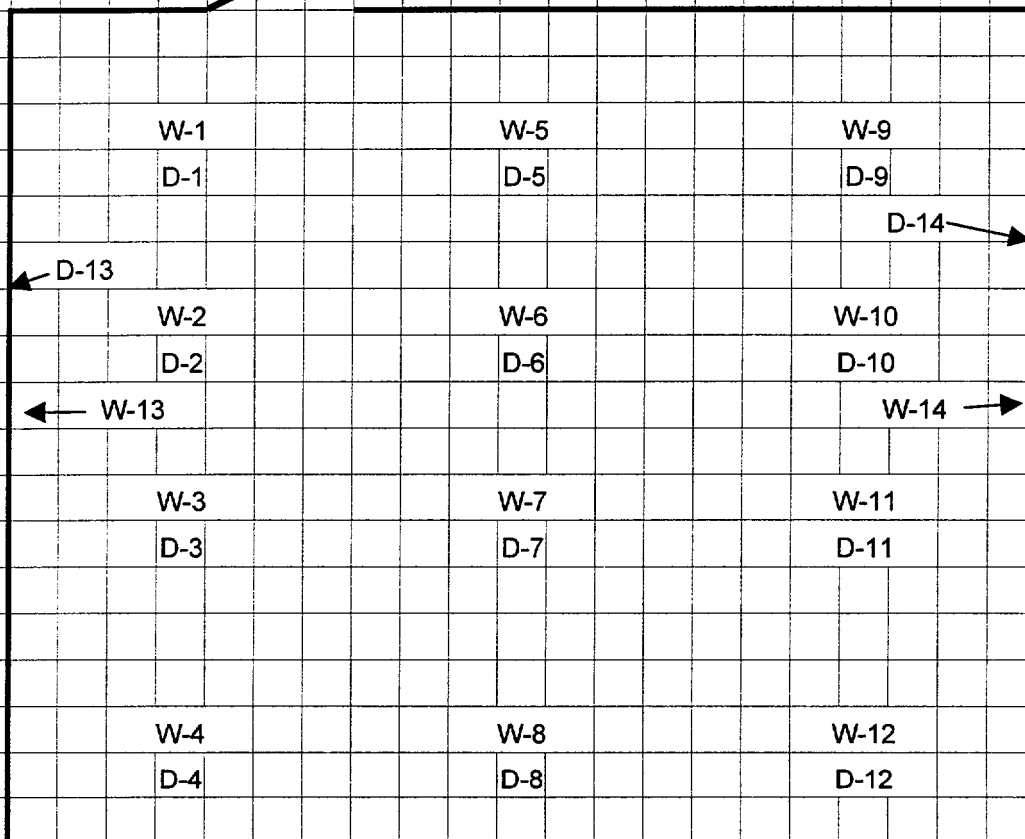
Direct Survey and Wipe locations

Location Stand 36 Floors & Walls Date 8/1/2002

Checked By KH

Date 6/18/07

Scale: Not to Scale



# **ATTACHMENT D**

## **Wipe Survey Results**





## Page 1 of 1

**Jay R. Dockendorff**  
Laboratory Director



## Page 1 of 1

**Jay R. Dockendorff**  
Laboratory Director





## Page 1 of 1

**Customer: UTRC**

**Location:** Rm 129G

Project: **UTRC Final Status Survey**

**Samp. Description: Wipes**

**Matrix: Wipes**

**I-129 LLD = 21.36**

**Jay R. Dockendorff**  
Laboratory Director

## Page 1 of 1

**All Results = dpm/100cm<sup>2</sup>**

Jay R. Dockendorff  
Laboratory Director

## Page 1 of 1

**I-129 LLD = 21.36**

**Jay R. Dockendorff**  
**Laboratory Director**



## Page 1 of 1

Jay R. Dockendorff  
Laboratory Director

## Page 1 of 1

Jay R. Dockendorff  
Laboratory Director

## Page 1 of 1

**All Results = dpm/100cm<sup>2</sup>**

Jay R. Dockendorff  
Laboratory Director







# **ATTACHMENT E**

## **Direct Survey Results**



**DIRECT SURVEY RESULTS**  
**United Technologies Research Center**  
**Final Status Survey**

9/17/2003

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Total Beta Counts	Gross Alpha CPM	Gross Beta CPM	Alpha BG CPM	Beta BG CPM	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Beta CPM/ 100cm2	Net Alpha DPM/ 100cm2			Net Beta DPM/ 100cm2		
125G/127G	D1	15	5	24	1085	5	217	4.50	159	425	0.09	13.65	0.46	+/-	0.12	97.48	+/-	3.53
125G/127G	D2	15	5	21	1003	4	201	4.50	159	425	-0.09	9.79	-0.45	+/-	0.12	69.92	+/-	3.53
125G/127G	D3	15	5	8	972	2	194	4.50	159	425	-0.68	8.33	-3.46	+/-	0.34	59.50	+/-	3.54
125G/127G	D4	15	5	14	869	3	174	4.50	159	425	-0.38	3.48	-1.95	+/-	0.26	24.87	+/-	3.54
125G/127G	D5	15	5	17	1079	3	216	4.50	159	425	-0.26	13.36	-1.35	+/-	0.21	95.46	+/-	3.54
125G/127G	D6	15	5	11	975	2	195	4.50	159	425	-0.56	8.47	-2.86	+/-	0.31	60.50	+/-	3.54
125G/127G	D7	15	5	13	994	3	199	4.50	159	425	-0.44	9.36	-2.26	+/-	0.28	66.89	+/-	3.54
125G/127G	D8	15	5	17	982	3	196	4.50	159	425	-0.26	8.80	-1.35	+/-	0.21	62.86	+/-	3.54
125G/127G	D9	15	5	26	1127	5	225	4.50	159	425	0.16	15.62	0.84	+/-	0.17	111.60	+/-	3.53
125G/127G	D10	15	5	21	1092	4	218	4.50	159	425	-0.07	13.98	-0.36	+/-	0.11	99.83	+/-	3.53
125G/127G	D11	15	5	19	989	4	198	4.50	159	425	-0.16	9.13	-0.84	+/-	0.17	65.21	+/-	3.53
125G/127G	D12	15	5	20	1075	4	215	4.50	159	425	-0.12	13.18	-0.60	+/-	0.14	94.12	+/-	3.53
125G/127G	D13	15	5	22	1022	4	204	4.50	159	425	-0.02	10.68	-0.12	+/-	0.06	76.30	+/-	3.53
125G/127G	D14	15	5	15	991	3	198	4.50	159	425	-0.35	9.22	-1.81	+/-	0.25	65.88	+/-	3.54

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Total Beta Counts	Gross Alpha CPM	Gross Beta CPM	Alpha BG CPM	Beta BG CPM	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Beta CPM/ 100cm2	Net Alpha DPM/ 100cm2			Net Beta DPM/ 100cm2		
129G	D1	15	5	29	1352	6	270	4.5	159	425	0.31	26.21	1.55	+/-	0.23	187.23	+/-	3.53
129G	D2	15	5	20	1168	4	234	4.5	159	425	-0.12	17.55	-0.60	+/-	0.14	125.38	+/-	3.53
129G	D3	15	5	24	1175	5	235	4.5	159	425	0.07	17.88	0.36	+/-	0.11	127.73	+/-	3.53
129G	D4	15	5	34	1168	7	234	4.5	159	425	0.54	17.55	2.64	+/-	0.29	95.92	+/-	2.70
129G	D5	15	5	16	1014	3	203	4.5	159	425	-0.31	10.31	-1.49	+/-	0.22	56.32	+/-	2.70
129G	D6	15	5	20	1018	4	204	4.5	159	425	-0.12	10.49	-0.57	+/-	0.14	57.34	+/-	2.70
129G	D7	15	5	19	994	4	199	4.5	159	425	-0.16	9.36	-0.80	+/-	0.16	51.17	+/-	2.70
129G	D8	15	5	18	1079	4	216	4.5	159	425	-0.21	13.36	-1.07	+/-	0.19	95.46	+/-	3.53
129G	D9	15	5	30	1321	6	264	4.5	159	425	0.35	24.75	1.79	+/-	0.25	176.81	+/-	3.53
129G	D10	15	5	27	1176	5	235	4.5	159	425	0.21	17.93	1.07	+/-	0.19	128.07	+/-	3.53
129G	D11	15	5	28	1212	6	242	4.5	159	425	0.26	19.62	1.31	+/-	0.21	140.17	+/-	3.53
129G	D12	15	5	31	1872	6	374	4.5	159	425	0.40	50.68	2.03	+/-	0.26	362.02	+/-	3.53
129G	D13	15	5	25	1136	5	227	4.5	159	425	0.12	16.05	0.60	+/-	0.14	114.62	+/-	3.53
129G	D14	15	5	21	1036	4	207	4.5	159	425	-0.07	11.34	-0.36	+/-	0.11	81.01	+/-	3.53

**DIRECT SURVEY RESULTS**  
**United Technologies Research Center**  
**Final Status Survey**

9/17/2003

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Total Beta Counts	Gross Alpha CPM	Gross Beta CPM	Alpha BG CPM	Beta BG CPM	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Beta CPM/ 100cm2	Net Alpha DPM/ 100cm2			Net Beta DPM/ 100cm2		
N265/263 H	D1	15	5	29	910	6	182	4.5	159	425	0.31	5.41	1.49	+/-	0.22	29.57	+/-	2.70
N265/263 H	D2	15	5	18	878	4	176	4.5	159	425	-0.21	3.91	-1.03	+/-	0.18	21.34	+/-	2.70
N265/263 H	D3	15	5	18	840	4	168	4.5	159	425	-0.21	2.12	-1.03	+/-	0.18	11.57	+/-	2.70
N265/263 H	D4	15	5	24	854	5	171	4.5	159	425	0.07	2.78	0.34	+/-	0.10	15.17	+/-	2.70
N265/263 H	D5	15	5	22	858	4	172	4.5	159	425	-0.02	2.96	-0.12	+/-	0.06	21.18	+/-	3.53
N265/263 H	D6	15	5	19	816	4	163	4.5	159	425	-0.16	0.99	-0.84	+/-	0.17	7.06	+/-	3.53
N265/263 H	D7	15	5	22	845	4	169	4.5	159	425	-0.02	2.35	-0.12	+/-	0.06	16.81	+/-	3.53
N265/263 H	D8	15	5	25	840	5	168	4.5	159	425	0.12	2.12	0.60	+/-	0.14	15.13	+/-	3.53
N265/263 H	D9	15	5	28	860	6	172	4.5	159	425	0.26	3.06	1.31	+/-	0.21	21.85	+/-	3.53
N265/263 H	D10	15	5	25	825	5	165	4.5	159	425	0.12	1.41	0.60	+/-	0.14	10.08	+/-	3.53
N265/263 H	D11	15	5	27	867	5	173	4.5	159	425	0.21	3.39	1.07	+/-	0.19	24.20	+/-	3.53
N265/263 H	D12	15	5	23	853	5	171	4.5	159	425	0.02	2.73	0.12	+/-	0.06	19.50	+/-	3.53
N265/263 H	D13	15	5	21	892	4	178	4.5	159	425	-0.07	4.56	-0.36	+/-	0.11	32.61	+/-	3.53
N265/263 H	D14	15	5	29	1048	6	210	4.5	159	425	0.31	11.91	1.55	+/-	0.23	85.04	+/-	3.53

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Total Beta Counts	Gross Alpha CPM	Gross Beta CPM	Alpha BG CPM	Beta BG CPM	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Beta CPM/ 100cm2	Net Alpha DPM/ 100cm2			Net Beta DPM/ 100cm2		
S265/263 H	D1	15	5	33	741	7	148	4.5	159	425	0.49	-2.54	2.51	+/-	0.29	-18.15	+/-	3.53
S265/263 H	D2	15	5	16	794	3	159	4.5	159	425	-0.31	-0.05	-1.55	+/-	0.23	-0.34	+/-	3.54
S265/263 H	D3	15	5	30	786	6	157	4.5	159	425	0.35	-0.42	1.79	+/-	0.25	-3.03	+/-	3.53
S265/263 H	D4	15	5	18	931	4	186	4.5	159	425	-0.21	6.40	-1.07	+/-	0.19	45.71	+/-	3.53
S265/263 H	D5	15	5	23	775	5	155	4.5	159	425	0.02	-0.94	0.12	+/-	0.06	-6.72	+/-	3.53
S265/263 H	D6	15	5	21	827	4	165	4.5	159	425	-0.07	1.51	-0.36	+/-	0.11	10.76	+/-	3.53
S265/263 H	D7	15	5	26	769	5	154	4.5	159	425	0.16	-1.22	0.84	+/-	0.17	-8.74	+/-	3.53
S265/263 H	D8	15	5	20	800	4	160	4.5	159	425	-0.12	0.24	-0.60	+/-	0.14	1.68	+/-	3.53
S265/263 H	D9	15	5	22	799	4	160	4.5	159	425	-0.02	0.19	-0.12	+/-	0.06	1.34	+/-	3.53
S265/263 H	D10	15	5	27	852	5	170	4.5	159	425	0.21	2.68	1.07	+/-	0.19	19.16	+/-	3.53
S265/263 H	D11	15	5	20	821	4	164	4.5	159	425	-0.12	1.22	-0.60	+/-	0.14	8.74	+/-	3.53
S265/263 H	D12	15	5	19	787	4	157	4.5	159	425	-0.16	-0.38	-0.84	+/-	0.17	-2.69	+/-	3.53
S265/263 H	D13	15	5	25	802	5	160	4.5	159	425	0.12	0.33	0.60	+/-	0.14	2.35	+/-	3.53
S265/263 H	D14	15	5	24	819	5	164	4.5	159	425	0.07	1.13	0.36	+/-	0.11	8.07	+/-	3.53

**DIRECT SURVEY RESULTS**  
**United Technologies Research Center**  
**Final Status Survey**

8/1/2002

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Gross Alpha CPM	Alpha BG CPM	Alpha cpm detector	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Alpha DPM/ 100cm2		
Stand 30A	D1	5	1	37	7	5.40	1.6	425	0.38	2.51	+/-	0.33
Stand 30A	D2	5	1	18	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 30A	D3	5	1	42	8	5.40	2.60	425	0.61	4.08	+/-	0.42
Stand 30A	D4	5	1	21	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 30A	D5	5	1	23	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 30A	D6	5	1	28	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 30A	D7	5	1	24	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 30A	D8	5	1	19	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 30A	D9	5	1	43	9	5.40	3.60	425	0.85	5.65	+/-	0.50
Stand 30A	D10	5	1	20	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 30A	D11	5	1	10	2	5.40	-3.40	425	-0.80	-5.33	+/-	0.48
Stand 30A	D12	5	1	12	2	5.40	-3.40	425	-0.80	-5.33	+/-	0.48
Stand 30A	D13	10	5	14	3	2.50	0.30	100	0.30	1.69	+/-	0.12
Stand 30A	D14	10	5	17	3	2.50	0.90	100	0.90	5.08	+/-	0.21

# DIRECT SURVEY RESULTS

## United Technologies Research Center

### Final Status Survey

8/1/2002

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Gross Alpha CPM	Alpha BG CPM	Alpha cpm detector	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Alpha DPM/ 100cm2		
Stand 31	D1	5	1	31	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 31	D2	5	1	17	3	5.40	-2.40	425	-0.56	-3.76	+/-	0.41
Stand 31	D3	5	1	34	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 31	D4	5	1	32	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 31	D5	5	1	13	3	5.40	-2.40	425	-0.56	-3.76	+/-	0.41
Stand 31	D6	5	1	28	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 31	D7	5	1	32	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 31	D8	5	1	11	2	5.40	-3.40	425	-0.80	-5.33	+/-	0.48
Stand 31	D9	5	1	37	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 31	D10	5	1	48	10	5.40	4.60	425	1.08	7.22	+/-	0.56
Stand 31	D11	5	1	36	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 31	D12	5	1	50	10	5.40	4.60	425	1.08	7.22	+/-	0.56
Stand 31	D13	10	5	12	2	2.50	-0.10	100	-0.10	-0.56	+/-	0.07
Stand 31	D14	10	5	15	3	2.50	0.50	100	0.50	2.82	+/-	0.16

# DIRECT SURVEY RESULTS

## United Technologies Research Center

### Final Status Survey

8/1/2002

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Gross Alpha CPM	Alpha BG CPM	Alpha cpm detector	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Alpha DPM/ 100cm2		
Stand 33	D1	5	1	22	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 33	D2	5	1	42	9	5.40	3.60	425	0.85	5.65	+/-	0.50
Stand 33	D3	5	1	42	9	5.40	3.60	425	0.85	5.65	+/-	0.50
Stand 33	D4	5	1	12	3	5.40	-2.40	425	-0.56	-3.76	+/-	0.41
Stand 33	D5	5	1	40	8	5.40	2.60	425	0.61	4.08	+/-	0.42
Stand 33	D6	5	1	28	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 33	D7	5	1	22	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 33	D8	5	1	12	2	5.40	-3.40	425	-0.80	-5.33	+/-	0.48
Stand 33	D9	5	1	36	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 33	D10	5	1	19	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 33	D11	5	1	28	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 33	D12	5	1	31	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 33	D13	10	5	16	3	2.50	0.70	100	0.70	3.95	+/-	0.19
Stand 33	D14	10	5	14	3	2.50	0.30	100	0.30	1.69	+/-	0.12

**DIRECT SURVEY RESULTS**  
**United Technologies Research Center**  
**Final Status Survey**

8/1/2002

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Gross Alpha CPM	Alpha BG CPM	Alpha cpm detector	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Alpha DPM/ 100cm2		
Stand 34I	D1	5	1	27	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 34I	D2	5	1	32	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 34I	D3	5	1	23	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 34I	D4	5	1	34	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 34I	D5	5	1	28	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 34I	D6	5	1	36	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 34I	D7	5	1	29	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 34I	D8	5	1	22	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 34I	D9	5	1	32	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 34I	D10	10	5	10	2	2.50	-0.50	100	-0.50	-2.82	+/-	0.16
Stand 34I	D11	5	1	33	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 34I	D12	10	5	12	2	2.50	-0.10	100	-0.10	-0.56	+/-	0.07
Stand 34I	D13	10	5	16	3	2.50	0.70	100	0.70	3.95	+/-	0.19
Stand 34I	D14	10	5	11	2	2.50	-0.30	100	-0.30	-1.69	+/-	0.12



**DIRECT SURVEY RESULTS**  
**United Technologies Research Center**  
**Final Status Survey**

8/1/2002

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Gross Alpha CPM	Alpha BG CPM	Alpha cpm detector	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Alpha DPM/ 100cm2		
Stand 34O	D1	5	1	39	8	5.40	2.60	425	0.61	4.08	+/-	0.42
Stand 34O	D2	5	1	26	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 34O	D3	5	1	32	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 34O	D4	5	1	33	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 34O	D5	5	1	15	3	5.40	-2.40	425	-0.56	-3.76	+/-	0.41
Stand 34O	D6	5	1	20	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 34O	D7	5	1	16	3	5.40	-2.40	425	-0.56	-3.76	+/-	0.41
Stand 34O	D8	5	1	14	3	5.40	-2.40	425	-0.56	-3.76	+/-	0.41
Stand 34O	D9	5	1	18	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 34O	D10	5	5	17	3	2.50	0.50	100	0.50	2.82	+/-	0.16
Stand 34O	D11	5	5	12	2	2.50	-0.50	100	-0.50	-2.82	+/-	0.16
Stand 34O	D12	5	5	13	4	2.50	1.50	100	1.50	8.47	+/-	0.27
Stand 34O	D13	10	5	14	3	2.50	0.30	100	0.30	1.69	+/-	0.12
Stand 34O	D14	10	5	14	3	2.50	0.30	100	0.30	1.69	+/-	0.12

**DIRECT SURVEY RESULTS**  
**United Technologies Research Center**  
**Final Status Survey**

8/1/2002

Area	Location	BG Count Time	Sample Count Time	Total Alpha Counts	Gross Alpha CPM	Alpha BG CPM	Alpha cpm detector	Detector Area cm2	Net Alpha CPM/ 100cm2	Net Alpha DPM/ 100cm2		
Stand 36	D1	5	1	33	7	5.40	1.60	425	0.38	2.51	+/-	0.33
Stand 36	D2	5	1	31	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 36	D3	5	1	31	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 36	D4	5	1	23	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 36	D5	5	1	27	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 36	D6	5	1	27	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 36	D7	5	1	30	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 36	D8	5	1	32	6	5.40	0.60	425	0.14	0.94	+/-	0.20
Stand 36	D9	5	1	17	3	5.40	-2.40	425	-0.56	-3.76	+/-	0.41
Stand 36	D10	5	1	19	4	5.40	-1.40	425	-0.33	-2.20	+/-	0.31
Stand 36	D11	5	1	26	5	5.40	-0.40	425	-0.09	-0.63	+/-	0.17
Stand 36	D12	5	1	17	3	5.40	-2.40	425	-0.56	-3.76	+/-	0.41
Stand 36	D13	10	5	13	3	2.50	0.10	100	0.10	0.56	+/-	0.07
Stand 36	D14	10	5	12	2	2.50	-0.12	100	-0.12	-0.68	+/-	0.08

# **ATTACHMENT F**

## **Summary Tables of Material Receipt and Disposal**



**Research Center**

411 Silver Lane  
East Hartford, CT 06108  
(860) 610-7000



UTRC possesses a long history of radioactive material receipt, use, and disposal that dates back to the early 1960's. Due to the nature of the record keeping at the time, records may be inconsistent or incomplete. Summary tables of the UTRC records are contained in herein.

Summary Record		Number of Pages
1)	Fe-55 Records	1
2)	Gd-153 Records	2
3)	Kr-85 Records	1
4)	Tm-170 Records	2
5)	Uranium Records	2
6)	Xe-133 Records	3
7)	Check Source Records	5
8)	Generally Licensed Device Records	4
9)	Other Sealed Source Records	3
10)	Irradiated Material Records	4
11)	Readily Dispersible Material Records	5
12)	Special Nuclear Material Records	1
13)	Radiography Records	1
14)	Disposal Records pursuant to 10 CFR 20.2003	3
15)	Disposal Records pursuant to 10 CFR 20.2005	1
16)	Disposal Records pursuant to 10 CFR 20.2103(b)(4)	3

Please note that UTRC found no evidence of disposal that required records pursuant to 10 CFR 20.2002, disposal of licensed material not otherwise authorized, or pursuant to 10 CFR 20.2004, disposal by incineration.

# Summary of Fe-55 Records

Date Received	Activity (Ci)	Past usage (e.g. Project)	Source Registration Number	Material Quantities	Disposal Date
12/01/70	0.015	Radioisotope Tech	571-7	1	07/29/92
12/22/81	0.002	Plasma Spray	E-176	1	07/29/92
12/22/81	0.05	Plasma Spray	E-254	1	07/29/92
10/15/82	0.05	PFG	E-753		07/29/92
12/01/83	0.05	PFG	F-379	2	07/29/92
12/01/83	0.05	PFG	F-380	2	07/29/92
03/01/84	0.05	PFG	F-549	2	07/29/92
03/08/84	0.05	Powder Feed Dev.	F-550	2	08/26/93
09/25/84	0.05	Powder Feed Gage	F-902	1	08/26/93
01/01/85	0.05	Powder Feed	G-301	1	08/26/93
01/15/86	0.05	Powder Feed Gage	H-414	2	08/26/93
01/15/86	0.05	Powder Feed Gage	H-415	2	08/26/93
05/01/86	0.05	CPPS Activity Support	H-762	1	08/26/93
09/22/86	0.05	Powder Gage	J-088	8	08/26/93
09/22/86	0.05	Powder Gage	J-089	8	03/17/98
09/22/86	0.05	Powder Gage	J-090	8	03/17/98
09/22/86	0.05	Powder Gage	J-091	8	08/26/93
09/22/86	0.05	Powder Gage	J-092	8	03/17/98
09/22/86	0.05	Powder Gage	J-157	8	03/17/98
09/22/86	0.05	Powder Gage	J-158	8	03/17/98
09/22/86	0.05	Powder Gage	J-159	8	08/26/93
10/01/88	0.05	Powder Gage Pratt & Whitney North Berwick	K-450A	9	11/25/02
10/10/88	0.05	Powder Gage Pratt & Whitney North Berwick	K-495	9	03/17/98
10/10/88	0.05	Powder Gage Pratt & Whitney North Berwick	K-496	9	03/17/98
10/10/88	0.05	Powder Gage Pratt & Whitney North Berwick	K-497	9	08/26/93
10/10/88	0.05	Powder Gage Pratt & Whitney North Berwick	K-498	9	03/17/98
10/10/88	0.05	Powder Gage Pratt & Whitney North Berwick	K-499	9	03/17/98
10/10/88	0.05	Powder Gage Pratt & Whitney North Berwick	K-500	9	07/18/00
10/10/88	0.05	Powder Gage Pratt & Whitney North Berwick	K-501	9	11/25/02
10/10/88	0.05	Powder Gage Pratt & Whitney North Berwick	K-502	9	08/26/93
10/01/88	0.05		K-545	1	08/26/93
05/24/89	0.05	Pratt & Whitney North Berwick Density Gage	L-240	5	07/18/00
05/24/89	0.05	Pratt & Whitney North Berwick Density Gage	L-241	5	08/26/93
05/24/89	0.05	Pratt & Whitney North Berwick Density Gage	L-243	5	07/18/00
05/24/89	0.05	Pratt & Whitney North Berwick Density Gage	L-244	5	11/25/02
06/01/89	0.05	Pratt & Whitney North Berwick Density Gage	L-396	5	03/17/98
01/26/90	0.05	NB PFG	L-944	9	07/18/00
01/26/90	0.05	No Berwick PFG	L-945	9	11/25/02
01/26/90	0.05	No Berwick PFG	L-946	9	11/25/02
01/26/90	0.05	No Berwick PFG	L-947	9	03/17/98
01/26/90	0.05	No Berwick PFG	L-948	9	11/25/02
01/26/90	0.05	No Berwick PFG	L-949	9	08/26/93
01/26/90	0.05	No Berwick PFG	L-950	9	08/26/93
01/26/90	0.05	No Berwick PFG	L-951	9	08/26/93
01/26/90	0.05	No Berwick PFG	L-952	9	08/26/93
2.1670 = Total Activity					
45 = Total number of Fe-55 sources					

# Summary of Gd-153 Records

Date Received	Activity (Ci)	Past usage (e.g. Project)	Source Registration Number	Physical and/or Chemical Form	Material Quantities	Disposal Date
06/03/71	0.0015	JT9D blade inspection		solid source	1	08/03/71
06/08/71	0.30			solid source		06/13/73
09/21/71	3.00			solid source		06/13/73
10/14/71	3.00	Radioisotope techniques		solid source	1	11/01/71
11/01/71	3.00			solid source		11/08/71
12/10/71	3.00			solid source		11/01/71
04/26/73	5.00	Fuel Cell XRF analysis prog		solid source	1	03/25/80
08/06/73	5.00	Fuel Cell XRF		solid source	1	10/19/76
02/06/74	2.00	Pt analyzer prod		sealed source	1	10/19/76
03/02/76	2.00			solid source		02/18/83
03/22/76	2.00	XRF Production		solid source	1	03/04/83
10/19/79	0.35			solid source		12/03/79
10/22/79	0.35	FT4A 9th stage compressor blade	Gd-1-5		1	12/03/79
01/03/80	0.35		Gd-1-5A			03/04/83
04/07/80	0.35		Gd-1-7			07/29/92
01/11/82	0.35	Plasma Spray	Gd-1-34		1	07/29/92
10/29/82	0.35	Dross Detection	Gd-1-65		1	07/29/92
03/10/83	0.35	Plasma Spray	Gd-1-83		1	07/29/92
03/10/83	0.35	LTG	Gd-1-84		1	07/29/92
06/18/84	0.35	LTG Auto Plasma Rig	Gd-1-166		2	07/29/92
06/18/84	0.35	LTG Auto Plasma Rig	Gd-1-167		2	07/29/92
07/31/84	0.35	Compressor Seals	Gd-1-182		1	07/29/92
10/31/84	0.35	LTG	Gd-1-204		1	07/29/92
11/16/84	0.35	LTG	Gd-1-210		1	07/29/92
01/22/86	0.35	LTG	Gd-1-353		1	07/29/92
06/17/86	0.35	LTG	Gd-1S-494		2	07/29/92
06/17/86	0.35	LTG	Gd-1S-495		2	07/29/92
06/17/86	0.35	LTG	Gd-1S-496		1	07/29/92
08/29/86	0.35	DG	Gd-1S-537		2	07/29/92
11/11/86	0.35	LTG	Gd-1S-554		1	07/29/92
01/23/87	0.35	LTG	Gd-1S-578		2	07/29/92
01/23/87	0.35		Gd-1S-579			07/29/92
10/02/87	0.35	LTG	Gd-1S-634A		1	07/29/92
12/29/87	0.35	LTG	Gd-1S-670A			07/29/92
12/29/87	0.35	DG	Gd-1S-671A			07/29/92
01/11/88	0.35	LTG	Gd-1S-684A			07/29/92
01/11/88	0.35	LTG	Gd-1S-686A			07/29/92
07/11/88	0.45	DG	G649			07/29/92
07/11/88	0.46	DG	G650			07/29/92
07/13/88	0.35	LTG	179-83-1			07/29/92
07/13/88	0.35	LTG	179-83-2			07/29/92
08/10/89	0.386	LTG	G721		1	07/29/92
08/29/89	0.35	DG	Gd-1S-538		2	07/29/92
12/20/89	1.00	NB Plasma Support	2240LN		2	08/26/93
12/20/89	1.00	NB Plasma Support	2242LN		2	03/17/98
12/29/89	1.00	Mfg Gages	2176LN		1	08/26/93
03/22/90	1.00	2347LN, 2349LN	2347LN			08/26/93
03/22/90	1.00	2347LN, 2349LN	2349LN			03/17/98
03/23/90	1.00		2376LN			08/26/93
07/02/90	1.00		2541LN			08/26/93
07/23/90	1.00		2494LN			03/17/98
10/12/90	1.00		2585LN			08/26/93
03/13/91	1.00		2669LN			03/17/98
07/01/91	1.00		2685LN			08/26/93
02/04/92	1.00	3012LN, 3013LN	3012LN			03/17/98
02/04/92	1.00	3012LN, 3013LN	3013LN			03/17/98
02/14/92	1.00		3030LN			03/17/98
03/19/92	1.00	3041LN, 3042LN	3041LN			03/17/98
03/19/92	1.00	3041LN, 3042LN	3042LN			03/17/98
07/29/93	1.00	3261LN, 3263LN	3261LN			03/17/98
07/29/93	1.00	3261LN, 3263LN	3263LN			03/17/98
10/29/93	1.00		3325LN			03/17/98
10/29/93	1.00		3326LN			03/17/98
10/29/93	1.00		3327LN			03/17/98

# Summary of Gd-153 Records

Date Received	Activity (Ci)	Past usage (e.g. Project)	Source Registration Number	Physical and/or Chemical Form	Material Quantities	Disposal Date
10/29/93	1.00		3328LN			03/17/98
11/15/93	1.00		3329LN			03/17/98
01/09/95	1.00	N.B. Density Gage	3457LN		1	Jul-95
03/15/95	1.00	3483LN, 3484LN	3483LN			03/17/98
03/15/95	1.00		3484LN			07/18/00
04/03/95	1.00	3504LN, 3510LN, 3513LN, 3514LN	3504LN			03/17/98
04/03/95	1.00		3510LN			07/18/00
04/03/95	1.00		3513LN			07/18/00
04/03/95	1.00	3504LN, 3510LN, 3513LN, 3514LN	3514LN			03/17/98
08/10/95	1.00	Free of charge replacement source	3525LN			03/17/98
10/25/96	1.00		3637LN			07/18/00
02/10/97	1.00		3583LN			07/18/00
02/10/97	1.00		3660LN			03/30/98
06/30/97	1.00		3580LN			07/18/00
06/30/97	1.00		3674LN			07/18/00
06/30/97	1.00	3674LN - 3677LN	3675LN			03/30/98
06/30/97	1.00	3674LN - 3677LN	3676LN			03/30/98
06/30/97	1.00	3674LN - 3677LN	3677LN			03/30/98
02/12/98	1.00		3785LN			07/18/00
05/28/98	1.00		3791LN			07/18/00
05/28/98	1.00		3794LN			11/25/02
09/08/98	1.00		3800LN			07/18/00
09/08/98	1.00		3801LN			07/18/00
03/09/99	1.00		3819LN			11/25/02
03/09/99	1.00		3820LN			11/25/02
07/21/99	1.00		3824LN			11/25/02
03/15/00	1.00		3882LN			11/25/02
03/15/00	1.00		3883LN			11/25/02
10/17/00	1.00		3894LN			in service in Density Guage S/N 2
10/17/00	1.00		3895LN			11/25/02
10/17/00	1.00		3896LN			11/25/02
12/11/01	1.00		3879LN			in service in Density Guage S/N 4
12/13/01	1.00		3878LN			in service in Density Guage S/N 3
93.7435 = Total Activity						
97 = Total number of Gd-153 sources						

## Summary of Kr-85 Records

Date	In-House Kr-85 Activity (Ci)	
04/30/65	200.00	200 Ci Receipt
01/31/66	82.07	108.4 Ci Release
02/07/66	231.96	150 Ci Receipt
05/24/67	263.41	50 Ci Receipt
02/16/68	518.21	267 Ci Receipt
12/09/69	685.92	225 Ci Receipt
10/13/70	654.83	5.3 Ci Release
05/09/79	375.42	Minus total individual run releases ('65-'79)
04/01/91	174.00	The 5/9/79 release activity decayed to the disposal day
04/01/91	174.00	Final measurement prior to transfer to other specific licensees
Mass Balance	0.00	

Kr-85 receipts were in gaseous form. Past usage included Kr-85 impregnation of aircraft parts in which the Kr-85 was subsequently released to the atmosphere. Kr-85 was also used as a calibration gas.



# Summary of Tm-170 Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Tm-170	03/11/63	2		in 1.9 mls HCl	06/19/63
					06/20/63
					06/21/63
					06/21/63
					06/22/63
					08/29/63
					11/27/63
					12/24/63
					09/24/64
					03/09/65
					04/29/65
Tm-170	03/11/63	0.1	rod source for use in turbine blades holes	solid irradiated wire	
Tm-170		0.501		low-level solid waste	01/16/64
Tm-170		0.1		lab waste	09/15/64
Zr-95, Sc-46, Hf-181, Cl-36, S-35, C-14, Tm-170, Cr-51		0.01		mixed isotope lab waste	09/15/64
Zr-95, Sc-46, Hf-181, Cl-36, S-35, C-14, Tm-170, Cr-51		0.0001		mixed isotope lab waste	09/15/64
Zr-95, Sc-46, Hf-181, Cl-36, S-35, C-14, Tm-170, Cr-51		0.0001		mixed isotope lab waste	09/15/64
C-14, uranium, Tm-170, TI-204, S-35, Cs-137		0.0032		mixed isotope lab waste	09/30/65

# Summary of Tm-170 Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Tm-170, Xe-133		0.001		lab waste	09/30/65
Tm-170, Xe-133		0.001		lab waste	09/30/65
Tm-170		0.001		lab waste	09/30/65
Receipts: 2 shipments Total: 2.10 Ci Period: 3/11/63 9/30/65					

# Summary of Uranium Records

Dates of usage	Past usage (e.g. Project)	Physical and/or Chemical Form	Material Quantities	Elemental Uranium Weight (lbs)	Activity (Ci)
<b>Purchased</b>					
03/13/73	Radioisotope Lab	UF <sub>6</sub> (97.65% U-235 enriched)	15 grams	0.02	7.20E-06
04/09/73	Radioisotope Lab	3/4" x 3" x 10 mil U-Nat foil		0.02	4.90E-06
		1" x 3" x 10 mil U-Dep foil		0.02	6.53E-06
04/13/73	Radioisotope Lab	4 - 2 cm L x 1 cm D U-Dep cyls		0.26	8.34E-05
04/25/73	Spectroscopic Studies	UO <sub>3</sub>	100 grams	0.18	5.91E-05
		UO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub> *6H <sub>2</sub> O	100 grams	0.10	3.37E-05
		UO <sub>2</sub> HPO <sub>4</sub> *4H <sub>2</sub> O	100 grams	0.12	3.86E-05
		UO <sub>2</sub> SO <sub>4</sub> *3H <sub>2</sub> O	100 grams	0.12	4.02E-05
04/25/73	Spectroscopic Studies	UO <sub>2</sub> F <sub>2</sub>	1 oz	0.05	1.56E-05
		UO <sub>2</sub> (CH <sub>3</sub> CO <sub>2</sub> ) <sub>2</sub> *H <sub>2</sub> O	1 oz	0.04	1.27E-05
		UO <sub>2</sub> I <sub>2</sub>	1 oz	0.03	9.15E-06
		UO <sub>2</sub> C <sub>2</sub> O <sub>4</sub> *3H <sub>2</sub> O	1 oz	0.04	1.16E-05
		UO <sub>2</sub> KF <sub>3</sub>	1 oz	0.04	1.31E-05
08/28/73	Spectroscopic Studies	(CH <sub>3</sub> COCHCOCH <sub>3</sub> ) <sub>2</sub> UO <sub>2</sub>	10 grams	0.01	3.61E-06
08/30/73	Anal Chem	UO <sub>2</sub> (C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> *2H <sub>2</sub> O	20 oz	0.70	2.26E-04
12/14/73	RF Plasma Dye Laser Proj	U <sub>3</sub> O <sub>8</sub>	200 grams	0.37	1.20E-04
		UH <sub>3</sub>	184 grams	0.40	1.29E-04
04/15/74	Plasma Studies	UO <sub>2</sub>	1 oz	0.06	1.77E-05
		UO <sub>2</sub> Mg(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>4</sub>	1 oz	0.03	9.03E-06
		U <sub>3</sub> O <sub>8</sub>	1 oz	0.05	1.71E-05
		U <sub>2</sub> O <sub>5</sub>	1 oz	0.05	1.72E-05
		UO <sub>2</sub> Na(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>3</sub>	1 oz	0.03	1.02E-05
		UO <sub>2</sub> Zn(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>4</sub>	1 oz	0.03	8.38E-06
		UO <sub>2</sub> ZnNa(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>5</sub>	1 oz	0.02	7.33E-06
04/15/74	Plasma Studies	US <sub>2</sub>	10 grams	0.02	5.59E-06
		U <sub>3</sub> N <sub>4</sub>	10 grams	0.02	6.58E-06
04/18/74	Plasma Studies	UO <sub>2</sub> Ni(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>4</sub>	10 grams	0.01	2.99E-06
		UF <sub>4</sub>	50 grams	0.08	2.69E-05
08/25/74	Spectroscopic Studies	4 - 2 cm L x 1 cm D U-Nat cyls w/0.3 cm hole in center		0.24	7.59E-05
03/20/75	Plasma Studies	UF <sub>4</sub> (U-Nat)	100 grams	0.17	5.38E-05
04/18/75	Uranium Chemistry	UCl <sub>4</sub>	40 grams	0.06	1.78E-05
09/04/75	Laser Spectroscopy	4 - 2 cm L x 1 cm D U-Dep cyls w/0.3 cm hole in center		0.24	7.59E-05
01/09/76	Plasma Studies	UC + UC <sub>2</sub>	10 grams	0.02	6.45E-06
02/04/76	PCR UF <sub>6</sub> RF Plasma Exp	UCl <sub>3</sub>	100 grams	0.13	4.07E-05
02/04/76	PCR UF <sub>6</sub> RF Plasma Exp	UC <sub>2</sub>	10 grams	0.02	6.45E-06
		UO <sub>4</sub>	10 grams	0.02	5.60E-06
02/04/76	PCR UF <sub>6</sub> RF Plasma Exp	USi <sub>2</sub>	10 grams	0.02	5.74E-06
02/10/76	Spec Studies	9 cm x 10 cm x 0.178 mm U-Nat foil		0.07	2.13E-05
02/10/76	Uranium Chemistry	5 - 2 cm L x 1 cm D U-Nat cyls w/0.3 cm hole in center		0.29	9.49E-05
		2 - 2 cm L x 1 cm D U-Nat cyls w/0.5 cm hole in center		0.10	3.13E-05
02/13/76	PCR	UF <sub>6</sub> (U-Nat)	5 lbs	3.38	1.09E-03
04/01/76	Uranium Chemistry	U turnings	250 grams	0.55	1.78E-04
06/02/76	Excited State Chem	10"L x 3/8"D U-Nat rod	2.2 lbs (approx)	0.75	2.40E-04
		1/4" x 14" U-Dep pc	0.5 lbs (approx)	0.59	1.90E-04
06/29/76	PCR Research	UF <sub>6</sub> (U-Nat)	5 lbs	3.38	1.09E-03
06/10/77	PCR UF <sub>6</sub> RF Plasma Exp	UF <sub>6</sub> (U-Nat)	5 lbs	3.38	1.09E-03
06/17/77	PCR UF <sub>6</sub> RF Plasma Exp	UF <sub>4</sub>	250 grams	0.42	1.35E-04
08/29/77	PCR UF <sub>6</sub> RF Plasma Exp	UF <sub>4</sub> (U-Dep)	1 kg	1.67	5.38E-04
09/02/77	PCR UF <sub>6</sub> RF Plasma Exp	UF <sub>4</sub>	2 lbs	1.52	4.88E-04
07/20/78	PCR UF <sub>6</sub> RF Plasma Exp	UF <sub>4</sub>	1.5 kg	2.51	8.07E-04
		UF <sub>4</sub>	500 grams	0.84	2.69E-04
10/16/78	Excited State Anal	U <sub>3</sub> O <sub>8</sub>	25 grams	0.05	1.51E-05
11/30/78	Excited State Anal	UF <sub>4</sub>	250 grams	0.42	1.35E-04
03/12/79	*electrode structure for laser testing*	UO <sub>2</sub> -W (U-Dep); 0.9g U?	1.2 grams	0.00	7.51E-07
		UO <sub>2</sub> -W (U-Dep); 3.1g U?	6 grams	0.01	3.76E-06
04/09/79	Uranium Analysis	UO <sub>2</sub>	100 grams	0.19	6.26E-05
05/07/79	Chemical Physics	9 cm x 10 cm x 0.178 mm U foil		0.07	2.13E-05
09/20/79	Photo Chemistry	UCl <sub>4</sub>	10 grams	0.01	4.45E-06
		UCl <sub>6</sub>	100 grams	0.12	3.75E-05
		U-Dep powder	50 grams	0.11	3.55E-05
Sum of all purchases =				24.24	4.73E-03

# Summary of Uranium Records

Dates of usage	Past usage (e.g. Project)	Physical and/or Chemical Form	Material Quantities	Elemental Uranium Weight (lbs)	Activity (Ci)
<b>Disposal</b>					
06/03/75		U-Nat waste (barrel V)	-94 grams	-0.14	-4.51E-05
06/03/75		U-Nat waste (barrel III)	-0.1 grams	0.00	-4.80E-08
06/03/75		U-Nat waste (barrel II)	-0.1 grams	0.00	-4.80E-08
06/03/75		U-Nat waste (barrel I)	-0.1 grams	0.00	-4.80E-08
06/03/75		U in vacuum pump oil	-121.13 grams	-0.18	-8.60E-05
06/14/77		U-Nat waste (barrel 77-5)	-43 grams	-0.06	-2.06E-05
06/14/77		U-Nat waste (barrel 77-1-4)	-60 grams	-0.09	-2.88E-05
08/18/77	PCR UF <sub>6</sub> RF Plasma Exp	U-depleted waste (2 barrels)	-882.00 grams	-1.31	-4.23E-04
08/26/77	Ar/UF <sub>6</sub> Plasma Confinement	UF <sub>6</sub> -Nat waste (1 barrel)	-2422.00 grams	-3.61	-1.16E-03
11/07/77	PCR UF <sub>6</sub> RF Plasma Exp	UF <sub>4</sub> waste (1 barrel)	-879.00 grams	-1.47	-4.73E-04
05/16/78	PCR	U-Nat waste (barrel 5)	-87.80 grams	-0.13	-4.22E-05
		U-Nat waste (barrel 6)	-56.70 grams	-0.08	-2.72E-05
		U-Nat waste (barrel 5)	-446.50 grams	-0.67	-2.14E-04
06/05/79	NASA Plasma Core Reactor	U-Nat waste (barrel 6)	-173.00 grams	-0.26	-8.31E-05
		U-Nat waste (barrel 7)	-1273.00 grams	-1.90	-6.11E-04
		U-Nat waste (barrel 8)	-391.00 grams	-0.58	-1.88E-04
		1990 SNM Disposal		-0.03	
		1992 Transuranic Disposal		-5.12	
		1993 Disposal		-1.95	
		1998 Disposal		-0.03	
		2002 Transfer		-0.02	
Sum of all Elemental Uranium Disposal =				-17.64	pounds
Purchase minus disposal =				6.60	pounds

# Summary of Xe-133 Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Disposal Date
Xe-133	09/28/62	1.0	2E3 uCi controlled release in hood with rated flow of	gas	11/16/62
Xe-133	11/29/62	1.0	1E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	01/20/63
Xe-133	02/04/63	1.0	2.35E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	02/15/63
Xe-133	02/20/63	1.0	5E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	03/16/63
Xe-133	03/25/63	1.0	6.4E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	04/15/63
Xe-133	04/25/63	5.0	3.6E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	05/15/63
Xe-133	05/15/63	5.0	1E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	06/14/63
Xe-133	06/17/63	5.0	7.5E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	07/19/63
Xe-133	07/22/63	5.0	2.06E-8 uCi held to decay and released into hood	gas	02/06/64
Xe-133	11/28/63	5.0	5.31E2 uCi controlled release in hood with rated flow of 1200 CFM	gas	02/06/64
Xe-133	01/28/64	5.0	1E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	03/30/64
Xe-133	02/14/64	3.0	1E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	03/20/64
Xe-133	02/14/64	5.0	see record for 1/28/64 shipment ????	gas	03/20/64
Xe-133	02/19/64	2.0	see record for 2/14/64 shipment ????	gas	03/20/64
Xe-133	03/31/64	2.0	8.7E2 uCi controlled release in hood with rated flow of 1200 CFM	gas	05/29/64
Xe-133	05/08/64	2.0	2.5E3 uCi controlled release in hood with rated flow of 1200 CFM	gas	06/30/64
Xe-133	07/02/64	5.0	6E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	07/17/64
Xe-133	07/06/64	2.0	implanted into rats - held to decay in rats to no activity - rats buried	gas	02/02/65
Xe-133	08/03/64	5.0	5E2 uCi controlled release in hood with rated flow of 1200 CFM	gas	10/12/64
Xe-133	08/06/64	2.0	prepared into seeds, decaying there - rats buried	gas	03/14/65
Xe-133	08/13/64	1.0	prepared into seeds, decaying there - removed from rats and pkg for disposal	gas	03/14/65
Xe-131	08/14/64	0.0	6.6E-1 uCi controlled release in hood with rated flow of 1200 CFM	gas	12/17/64

# Summary of Xe-133 Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Xe-133	09/08/64	3.0	prepared into seeds, decaying there - rats buried	gas	03/14/65
Xe-133	10/12/64	3.0	2.2E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	11/09/64
			2.51E3 uCi controlled release in hood with rated flow of 1200 CFM		12/02/64
			3.02E-3 uCi controlled release in hood with rated flow of 1200 CFM		03/14/65
Xe-133	11/09/64	2.0	2.5E3 uCi controlled release in hood with rated flow of 1200 CFM	gas	12/04/64
			3.86E2 uCi controlled release in hood with rated flow of 1200 CFM		12/22/64
Xe-133	11/23/64	3.0	7.69E5 uCi controlled release into hood	gas	11/24/64
			prepared into seeds, remainder held to decay on 8/30/65		08/30/65
Xe-133	01/18/65	3.0	8.77E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	01/18/65
			7.69E5 uCi controlled release in hood with rated flow of 1200 CFM		01/19/65
			6.74E5 uCi controlled release in hood with rated flow of 1200 CFM		01/20/65
Xe-133	01/25/65	1.8	3E3 uCi controlled release into hood with rated flow of 1200 CFM	gas	01/29/65
			implanted seeds, remainder held to decay on 8/30/65		08/30/65
Xe-133	08/30/65	3.0	made seeds, oil tagging experiment. 577 mCi controlled release into hood with rated flow of 1200 CFM	gas	08/31/65
			118 mCi encapsulated in Kel-F and disposed of by Allied Crossroads		09/15/65
			made seeds, oil tagging experiment. 88.3 uCi, controlled release into hood with rated flow of 1200 CFM		10/08/65
			made seeds, oil tagging experiment. 12 uCi controlled release into hood with rated flow of 1200 CFM		10/15/65
			held for decay.		01/11/66
Xe-133	12/17/66	4.0	controlled release in hood	gas (wall thickness measurement)	04/19/67
Xe-133	11/13/67	11.0	held to decay	gas (wall thickness measurement)	
Xe-133	12/28/67	11.0	held to decay	gas	07/16/68

# Summary of Xe-133 Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Disposal Date
Xe-133, Kr-85, Tl-204, Cr-51, Hf-181		0.001		mixed isotope lab waste	09/30/65
Xe-133, Cr-51, Kr-85		0.161		mixed isotope lab waste	09/30/65
Tm-170, Xe-133		0.001		lab waste	09/30/65
Tm-170, Xe-133		0.001		lab waste	09/30/65
Receipts: 32 shipments Total: 108.80 Ci Period: 09/28/62 07/16/68					

# Summary of Check Source Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Am-241	09/20/70	4.69E-08			12/9/02
Ba-133	1966	1.15E-05			7/29/92
Ba-133	05/08/63	1.64E-07			9/30/65
Ba-133	06/01/63	?			9/30/65
Bi-210		1.00E-06			7/29/92
C-14		1.00E-06			7/29/92
C-14	05/19/05	1990 B/sec			7/29/92
C-14	1960	1.10E-07			7/29/92
C-14					7/29/92
C-14	01/01/64				returned immediately to US Nuclear
Cd-109	08/13/80	1.00E-02	Plasma Spray Gage		
Cl-36		2.11E-08	Radioisotope Lab		7/29/92
Cl-36	05/17/05	354 B/sec			7/29/92
Cl-36		1.00E-05			8/24/77
Co-57	05/22/67	1.50E-03	Radioisotope		7/29/92
Co-57	05/17/71	5.00E-02	Radioisotope Lab		
Co-57	1966	8.70E-06			7/29/92
Co-57	1965	1.88E-07			7/29/92
Co-57		2.00E-03	Radioisotope		
Co-57	01/01/64	2.74E-07			1/8/64
Co-57	12/03/69	1.54E-06			7/29/92
Co-60	1966	3.00E-06			7/29/92
Co-60		1.00E-06			7/29/92
Co-60		1.00E-06			7/29/92



# Summary of Check Source Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Disposal Date
Co-60		9.60E-06			7/29/92
Co-60		2.80E-06		Amersham	
Co-60	1966	9.60E-06			
Co-60	1965	1.08E-07			7/29/92
Co-60	1964	505 B/sec			7/29/92
Co-60	01/01/64	1.04E-07			1/8/64
Co-60	05/08/63	4.80E-07			4/19/65
Co-60	1959	5.20E-08			7/29/92
Co-60	12/03/69	1.06E-06			7/29/92
Co-60	09/09/66	6.40E-06			7/29/92
Cs-137	11/03/71	4.00E-02			
Cs-137	1966	3.50E-06			7/29/92
Cs-137		1.00E-06			7/29/92
Cs-137	1966	1.22E-05			7/29/92
Cs-137	10/03/68	8.70E-02			
Cs-137	11/03/71	3.00E-02			
Cs-137	1965	1.03E-07			7/29/92
Cs-137/Ba-137	1964	318 B/sec			7/29/92
Cs-137	05/08/63	3.00E-07			4/19/65
Cs-137	04/20/65	3.77E6 dpm			4/26/65
Cs-137		2.00E-06			7/29/92

# Summary of Check Source Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Disposal Date
Cs-137	06/22/90	1.00E-06			12/9/02
Cs-137	01/01/64	1.78E-07	returned to US Nuclear almost immediately because of impurities		returned to US Nuclear almost immediately because of impurities
Cs-137		1.00E-05			1998
Fe-55	11/21/79	1.66E-07			7/29/92
Fe-55	05/22/67	8.00E-05	Radioisotope		7/29/92
Fe-55		1.00E-05	Plasma Spray Support	Check Sources	
Fe-55		9.11E-06			12/9/02
Gd-153	11/15/96	1.00E-06	Plasma Spray Support	Check Sources	
Gd-153		9.85E-05			12/9/02
I-129		2.00E-07			7/29/92
Kr-85		1.00E-02			7/29/92
Kr-85					7/29/92
Kr-85	05/03/62	3.00E-03			
Kr-85		1.00E-02			7/29/92
Kr-85					7/29/92
Mixed	10/19/78	2.00E-06	Radioisotope Lab	Check Sources	
Mixed isotopes		1.00E-06			6/14/77
Mn-54		1.00E-06			7/29/92
Mn-54	1966	1.43E-05			7/29/92
Mn-54	1965	1.06E-07			7/29/92

# Summary of Check Source Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Mn-54	01/01/64	1.71E-07			returned to US Nuclear
Na-22		1.00E-06			7/29/92
Na-22	1966	1.23E-05			7/29/92
Na-22	1965	1.26E-07			7/29/92
Ni-63	05/08/63	1.40E-07			4/19/65
Pa-234		1.00E-06			7/29/92
Pa-234	1960	1.10E-08			7/29/92
Pb-210					1998
Pm-147	05/08/63	4.60E-07			4/19/65
Pm-147	01/08/74	5.00E-05			7/29/92
Po-210	05/08/63	8.00E-07			4/19/65
Ra D+E	01/08/74	2.00E-05			7/29/92
Ra-226	09/13/64	5.00E-06			6/23/67
Ra-226					3/31/03
Sr-90/Y-90	08/16/66	900 B/sec			7/29/92
Sr-90	06/10/63	5.15E-08			9/23/64
Sr-90		1.00E-06			7/29/92
Sr-90	01/08/74	5.00E-06		Check Sources	transferred from PWA EH&S
Sr-90/Y-90		4.87E4 cpm			12/9/02
Tl-204	07/05/84	7.00E-04	Graded Seals		
Tl-204		1.00E-06			7/29/92
Tl-204		1.00E-06			7/29/92

# Summary of Check Source Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Ti-204	12/17/69	2.91E-06			7/29/92
Ti-204		9.20E-08			9/23/64
Ti-204	1959	2.70E-08			7/29/92
Ti-204	01/08/74	5.00E-05			7/29/92
Ti-204	1966				
Zn-65	08/14/68	2.00E-03			
					1998

# Summary of Generally Licensed Devices Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Device Description	Disposal Date
Am-241		1.700E-05		17 Fenwal smoke detectors (1 uCi ea)	7/18/00
Am-241		4.800E-04		6 Pyrotronics smoke detectors (80 uCi ea)	7/18/00
Am-241		3.000E-02		CC593 (Metorex SSPS probe)	5/21/03
Cd-109	07/11/94	1.000E-02		AA-605 (Metorex)	11/19/96
Cd-109	07/18/96	2.000E-02		GG686 (Metorex SSPS probe)	5/21/03
Cs-137		1.800E-06		electron tube	1/31/69
Fe-55	11/08/84	3.000E-02		Columbia Scientific Model 84 XRF Probe (N114K) 1869LG	7/29/92
H-3	01/11/63	3.100E-04		tritium foil in helium detector	1/1/82
Kr-85				1385T (TSI)	
Kr-85		1.000E-02		aerosol neutralizer	8/8/77
Kr-85	07/26/77	1.000E-02		TSI aerosol neutralizer	8/8/77
Kr-85	11/02/77	1.000E-02		TSI aerosol neutralizer	4/14/78
Ni-63	12/13/01			311 (GC)	
Ni-63				7 EG&G vacuum tubes	7/18/00
Ni-63		8.000E-03		A4308	9/9/99
Ni-63		8.000E-03		A4309	9/9/99
Ni-63		8.000E-03		A4674	9/9/99
Ni-63		8.000E-03		A4675	9/9/99
Ni-63		3.200E-02		ECD (S/N A4308)	9/27/99
Ni-63		3.200E-02		ECD (S/N A4309)	9/27/99
Ni-63		3.200E-02		ECD (S/N A4674)	9/27/99
Ni-63		3.200E-02		ECD (S/N A4675)	9/27/99
Ni-63				K0940 (GC)	
Ni-63	12/13/01			U3490 (GC)	

# Summary of Generally Licensed Devices Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Device Description	Disposal Date
Pm-147				17945	2/22/01
Po-210				3 Staticmaster cartridges	4/29/93
Po-210	10/15/86	1.000E-02		Air gun C07312	11/3/87
Po-210	10/18/84	1.000E-02		Air gun C49369	10/23/85
Po-210	10/16/85	1.000E-02		Air gun C58017	10/23/86
Po-210	10/16/85	2.000E-02		Air gun C59636	9/25/86
Po-210	11/08/82	1.000E-02	Photo Lab	Air gun D10824	11/23/83
Po-210				Air gun D12323	6/1/84
Po-210				Air gun D15295	12/4/84
Po-210	03/19/84	1.000E-02		Air gun D17076	4/30/85
Po-210	11/13/84	1.000E-02	Photo Lab	Air gun F02113	1/22/86
Po-210	10/28/85	1.000E-02	Photo Lab	Air gun F07465	12/1/86
Po-210	03/21/85	1.000E-02	Photo Lab	Air gun F09131	3/25/86
Po-210	03/19/86	1.000E-02	Photo Lab	Air gun F26500	3/27/87
Po-210				Air gun F30432	11/1/87
Po-210	01/31/78	1.000E-02	Photo Lab	air ionizer	2/5/79
Po-210	09/28/79	1.000E-02	Photo Lab	air ionizer	9/1/80
Po-210	01/28/80	1.000E-02	Photo Lab	air ionizer	2/1/81
Po-210	09/22/80	1.000E-02	Photo Lab	air ionizer	11/20/81
Po-210	01/29/81	1.000E-02	Photo Lab	air ionizer	3/1/83
Po-210	04/28/81	1.000E-02		air ionizer	4/30/82

# Summary of Generally Licensed Devices Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Device Description	Disposal Date
Po-210	10/26/83	0.01	Photo Lab	air ionizer	12/14/84
Po-210	11/13/86	0.01	Photo Lab	air ionizer	11/24/87
Po-210	03/18/87	0.01	Photo Lab	air ionizer	2/29/88
Po-210	07/09/87	0.01		air ionizer	2/1/88
Po-210	10/18/87	0.01		air ionizer	2/1/88
Po-210	11/03/87	0.01	Photo Lab	air ionizer	2/29/88
Po-210	10/18/84	0.02		Air nozzle C49497	10/23/85
Po-210	06/27/86	0.01		Air nozzle D61424	8/10/87
Po-210	06/27/86	0.01		Air nozzle D61425	8/10/87
Po-210	06/25/85	0.01		Air nozzle D71734	8/1/86
Po-210	06/25/85	1.000E-02		Air nozzle D71735	8/1/86
Po-210	08/05/73	0.000001		Anti static brush	6/3/75
Po-210		0.000415		Anti static brushes	6/14/77
Po-210				anti-static brush	1/13/70
Po-210	09/26/78	0.01	Photo Lab	antistatic device	10/26/79
Po-210	01/31/79	0.01		antistatic device	2/1/80
Po-210	11/13/81	0.01	Photo Lab	antistatic device	2/1/83
Po-210	03/18/83	0.01	Photo Lab	antistatic device	6/29/83
Po-210	01/17/77	0.024	Physical electronics	static eliminator	1/12/78
Po-210		0.0005		static eliminator	7/18/00

# Summary of Generally Licensed Devices Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Device Description	Disposal Date
Po-210		0.0005		static eliminator	7/18/00
Ra-226		0.0002		10 Pyrotronics smoke detectors (20 uCi ea)	7/18/00
Ra-226		0.001		2 Alphatron gauges	02/29/70
Ra-226		0.00008		2 smoke detectors	4/27/70
Ra-226		0.00008		2 smoke detectors	8/27/70
Ra-226	11/13/73	0.0005	Instrumentation maintenance	Alphatron gauge	6/3/75
Ra-226	08/24/77	100 ug		Alphatron gauge	8/26/77
U-238				VWR Scientific hollow cathode tube	7/18/00
				Pyr-a-larm smoke detector	7/29/92



# Summary of Other Sealed Source Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Device Description	Disposal Date
Am-241	08/28/79	4.500E-02		2562LA	7/18/00
Am-241	07/17/80	4.500E-02	Plasma spray gage	3641LA	7/29/92
Am-241		3.000E+00		71-1-12	6/1/85
Am-241		5.000E+00		71-1-217	6/1/85
Am-241	11/05/70	3.000E-02	Radioisotope Techniques	7247/4	7/29/92
Am-241	08/12/80	1.000E-02		A-734	7/29/92
Am-241	08/12/80	1.000E-02		A-738	7/29/92
Am-241	02/26/81	1.000E-02		A-901	7/29/92
Am-241	02/26/81	1.000E-02		A-902	7/29/92
Am-241	02/26/81	1.000E-02		A-903	7/29/92
Am-241	02/26/81	1.000E-02		A-905	7/29/92
Am-241	08/11/70	1.400E-02	Radioisotope Techniques	AMC 1757	7/29/92
Am-241	11/16/67	2.000E-03		AMC 640	7/29/92
Am-241	06/10/63	1.033E-04		Sealed source	10/14/64
Am-241	11/16/77	1.400E-02	HIP density gage	Z3969	7/29/92
Am-241	11/16/77	1.400E-02	HIP density gage	Z3970	7/29/92
Am-241/Be neutron source	05/25/75	5.000E+00	TLP Boron	sealed source	6/10/85
Am-241/Boron neutron source	06/29/73	3.000E+00	Radioisotope Tech	sealed source	6/10/85
Ba-133	06/24/86	2.500E-02		3600GS	8/26/93
Ba-133	06/10/63	2.500E-07		Sealed source	4/19/65
Ca-45	06/10/63	8.500E-08		Sealed source	4/19/65
Cd-109		1.000E-02		0828LU	7/29/92
Cd-109	06/10/63	1.100E-07		Sealed source	4/19/65
Cm-244	12/06/77	6.600E-02		39084	7/29/92

# Summary of Other Sealed Source Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Device Description	Disposal Date
Cm-244	12/08/77	1.200E-01	ELCA ?	Solid source	7/29/92
Co-57		5.000E-02		CTC.240	7/29/92
Co-60		2.000E-02			7/29/92
Cs-131	09/03/65	1.480E-01		Sealed source	9/13/65
Cs-137		4.000E-02		1327	7/29/92
Cs-137		8.700E-02		M344	7/29/92
Cs-137		3.000E-02		M569	7/29/92
Cs-137	06/26/69	4.000E+00	Radioisotope Lab	N489	7/29/92
Kr-85	05/20/75	1.000E-01		4738	8/16/75
Kr-85	05/09/75	1.000E-01	Radioisotope Tech	KAC-4	
Kr-85		1.000E-01		Sealed source	7/1/75
Kr-85	05/03/62	3.000E-03		Kr130	7/29/92
Kr-85		6.000E-02		Sealed source	
Kr-85		1.000E-01		Sealed source	7/1/75
Ni-63		1.500E-02		276-121	7/29/92
Ni-63		1.500E-02		276-142	7/29/92
Ni-63		1.500E-02		276-98-1	7/29/92
Pb-210	10/18/65	2.200E-02		Sealed source	12/15/65
Pm-147	03/25/71	5.000E-01		NS461	2/18/72
Rn-222	09/03/65	1.250E-03		Sealed source	9/13/65
Tl-204		7.000E-04		11892	7/29/92

# Summary of Other Sealed Source Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Device Description	Disposal Date
Zn-65		0.002		409-29	7/29/92

# Summary of Irradiated Material Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Disposal Date
Au-198	11/16/66	5.830E-04		solid (transistors, etc)	12/8/66
Fe-59	10/08/62	2.000E-03		2 irradiated sealed cubes	4/8/63
Fe-59	05/06/63	1.000E-03		2 irradiated 2"x2"x1cm irradiated plates	10/7/63
Hf-181	01/27/64	8.000E-03		solid (irradiated Zr crucible)	2/19/65
Hf-181	03/05/65	3.000E-03		solid (irradiated Zr crucible)	6/9/65
Hf-181	03/29/65	9.000E-03		solid (2 irradiated Zr crucible)	6/9/65
Na-24	01/16/63	1.000E-03		irradiated core material	4/1/63
Na-24	05/20/63	3.000E-04		core material	1/16/64
Na-24	05/21/63	1.000E-03		crucible	9/23/64
Na-24	06/24/63	8.500E-02		irradiated crucible	1/16/64
Na-24	09/24/63	5.000E-03		10 irradiated alumina crucibles	9/23/64
Na-24	09/27/63	1.400E-05		30 mm irradiated silicone wafer	3/3/64
Na-24	09/27/63	3.400E-05		8 mm irradiated silicone wafer	3/3/64
Na-24	09/27/63	3.000E-07		2 mm irradiated silicone wafer	3/3/64
Na-24	09/30/63	2.000E-03		core material	1/16/64
Si-31	03/25/64	1.000E-03		4 irradiated silica wafers	4/20/64
Si-31	08/31/65	2.000E-04		2 irradiated silica crystals	
Si-31	12/15/65	2.000E-04		2 irradiated silica crystals	
Si-31	03/04/66	2.000E-03		irradiated optical crystals	
Sc-46, Zn-65, Cs-134, Fe-59	05/22/72	1.000E-03		Neutron irradiated carbon seals	6/3/75
Sc-46, Zn-65, Cs-134, Fe-59		2.000E-04		Neutron irradiated carbon seals	6/3/75
Na-24, Co-60		5.000E-04		material in spool of filament	6/3/75
	04/01/77	5.000E-06		29 irradiated LED's	5/26/77
Co-60, Zr-95	08/16/77	8.000E-04		irradiated glass specimens	10/6/77

# Summary of Irradiated Material Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Co-60, Zr-95	09/26/77	3.000E-04		irradiated glass specimens	10/17/77
Co-60, Zr-95	10/26/77	2.000E-04		irradiated glass specimens	11/8/77
Sc-46	11/06/63	1.000E-02		irradiated alumina crucible	1/4/64
				irradiated SiO2	7/29/92
		5.000E-05		irradiated electronics	7/29/92
Co-60		1.154E-09		irradiated electronic components	3/17/98
Co-60	05/03/62	2.000E-02		solid irradiated wire	
3-83 NOS	03/25/77	5.000E-02		activation products (28 electronic devices)	
3-83 NOS	04/29/77	2.500E-05		activation products (12 transistors & 8 IC's)	
Fe-55	06/17/78	1.000E-03		irradiated steel bearings (6) and wear metals (4 quartz ampoules)	
				Irradiate furnished samples	
Mo-99	04/29/66	1.000E-05	Microwave Physics	Irradiate SrO & BaO crystals	
			Microwave Physics	Irradiate 4 BeO crystals	
			Microwave Physics	Irradiate CaO crystals	
			Microwave Physics	Irradiate SrO & BaO crystals	
	04/29/66	1.000E-07	Microwave Physics	Irradiate BO crystals	
Ca-47	04/29/66	1.010E-05	Microwave Physics	Irradiate CaO crystals	
Na-24/Co-60	09/30/68	1.000E-03	Radioisotope Lab	Irradiate 6 C seals or C filament	Barrel 1 on 8/10/73
Au-199	09/25/69	1.000E-03	Fuel Cell	Irradiated Pt electrode in carbon-teflon matrix (6 items)	
	11/04/69	1.500E-02	Fuel Cell Radioactive Tracer	Irradiate Pt pwd & Pt electrodes (4 items)	
Au-199/Pt-197	11/13/69	1.500E-02	Fuel Cell Radioactive Tracer	Irradiate Pt pwd & Pt electrodes (5 items)	

# Summary of Irradiated Material Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Au-199/Pt-197				Irradiated Pt pwd & Teflon tape (1st, 2nd, & 3rd irradiations)	2/25/70
Au-199			Fuel Cell Experiment	Irradiated Pt electrodes (all electrodes from 1st, 2nd, & 3rd irradiations)	12/3/69
Au-199/Pt-197		2.2E-09		Dilutions of irradiated Pt pwd (2nd irradiation)	11/6/69
Pt-197/Pt-199/Au-198		0		930 mls of H2PO4 w/residual irradiated Pt electrodes	2/24/70
	05/27/66	0.0004043		8 irradiated SiO crystals	
	07/07/66			14 irradiated SiO crystals	
	10/07/66	5.73245E-05		6 irradiated SiO crystals	
	10/29/66	0.0000051		6 irradiated SiO crystals	
	03/03/67	0.00000325		6 irradiated SiO crystals	
	04/13/67	0.00013526		6 irradiated SiO crystals	
	04/19/67	2.119E-04		6 irradiated SiO crystals	
	07/14/67	0.0000088		6 irradiated SiO crystals	
			Optical Properties of Transparent Materials	Irradiate 8 SiO specimens	
			Optical Properties of Transparent Materials	Irradiate 9 SiO specimens	
			Optical Properties of Transparent Materials	Irradiate 12 SiO specimens	
			Optical Properties of Transparent Materials	Irradiate 6 SiO specimens	
			Optical Properties of Transparent Materials	Irradiate 6 SiO specimens	
			Optical Properties of Transparent Materials	Irradiate 18 SiO specimens	
			Optical Properties of Transparent Materials	Irradiate 12 SiO specimens	
			Optical Properties of Transparent Materials	Irradiate 6 SiO specimens	

# Summary of Irradiated Material Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
		0.003		Irradiated Si, alumina, BeO	
Na-24/Si-31/Al-28	06/26/70	0.001		irradiated silica & alumina crystals	
Sr-85/Sr-89	04/29/66	0.0003	Microwave Physics	Irradiated SrO crystals	
Sr-85	07/27/66	0.0003	Microwave Physics	Irradiated SrO crystals	
Na-24/Cr-51/Cu-64/Si-31/Al	10/06/69	0.0815		Irradiated silica on alumina mount	3/11/70

# Summary of Redily Dispersable Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
?	05/03/72	1.000E-06		Activated propellant samples	6/14/77
C-14		1.500E-08		Liq Scint Std (in 50 mls Toluene) P/N Ra-051	8/26/93
C-14		9.600E-08		Liq Scint Std-Quenched std #1 (50 mls)	8/26/93
C-14		9.600E-08		Liq Scint Std-Quenched std #2 (50 mls)	8/26/93
C-14		9.600E-08		Liq Scint Std-Quenched std #3 (50 mls)	8/26/93
C-14		9.600E-08		Liq Scint Std-Quenched std #4 (50 mls)	8/26/93
C-14		9.600E-08		Liq Scint Std-Quenched std #5 (50 mls)	8/26/93
C-14		9.600E-08		Liq Scint Std-Quenched std #6 (50 mls)	8/26/93
C-14	08/07/63	4.490E-06		in 9.9 mls Na2CO3 soln	1/16/64
C-14	08/07/63	4.490E-06		in 9.9 mls Na2CO3 soln	11/18/64
C-14	08/07/63	4.490E-06		in 9.9 mls Na2CO3 soln	3/8/65
C-14	08/07/63	4.490E-06		in 9.9 mls Na2CO3 soln	6/23/67
C-14	09/20/63	1.000E-04		in p-xylene	3/8/65
C-14	09/20/63	5.000E-04		in methanol	3/8/65
C-14		2.14E5 dpm		181500-1 (standards soln)	
C-14		2.14E5 dpm		181500-2 (standards soln)	
C-14		2.14E5 dpm		181500-3 (standards soln)	
C-14		2.14E5 dpm		181500-4 (standards soln)	
C-14		2.14E5 dpm		181500-5 (standards soln)	
C-14		2.14E5 dpm		181500-6 (standards soln)	
C-14		3.26E4 dpm		RA051 (standards soln)	
C-14				powder on substrate	7/29/92
C-14				beta coincidence	7/29/92
C-14 + activated refractory materials, Be		1.000E-03		lab waste	9/15/64
Cd-109		5.000E-07			7/29/92
Cd-109		1.000E-06			7/29/92



# Summary of Redily Dispersable Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Disposal Date
Cd-109		1.000E-05			7/29/92
Cl-36	08/05/77	1.000E-05		deposited NaCl between 2 sheets of mylar	8/24/77
Cl-36	05/08/64	2.000E-04		in 0.9N HCl	6/23/67
Co-57		1.000E-08		on Pd backing	7/29/92
Co-57	09/17/69	1.000E-06		5 mls of liquid	6/3/75
Co-57		3.300E-06		Mossbauer source	7/29/92
Co-57				foil	12/17/70
Co-60		2.154E-08		paper towels	3/17/98
Cr-51	09/09/64	2.000E-03	Tracer experiments of microcircuit surface contamination	sodium chromate soln	
Cr-51	09/09/64	2.000E-03		sodium chromate soln	3/1/65
Cs-137	09/17/69	1.000E-06		5 mls of liquid	6/3/75
Cs-137	10/22/62	1.000E-04		liquid	3/9/65
Cs-137	10/22/62	1.230E-04		as CsCl in HCl	3/9/65
H-3		5.400E-08		Liq Scint Std (in 50 mls Toluene) P/N Ra-052	8/26/93
H-3		4.150E-07		Liq Scint Std-Quenched std #1 (50 mls)	8/26/93
H-3		4.150E-07		Liq Scint Std-Quenched std #2 (50 mls)	8/26/93
H-3		4.150E-07		Liq Scint Std-Quenched std #3 (50 mls)	8/26/93
H-3		4.150E-07		Liq Scint Std-Quenched std #4 (50 mls)	8/26/93
H-3		4.150E-07		Liq Scint Std-Quenched std #5 (50 mls)	8/26/93
H-3		0.5		fittings and septums	7/29/92
H-3	11/18/64	1		as H2O	11/18/64
H-3	11/18/64	1		gas	11/18/64
H-3		1.2E5 dpm		RA052 (soln)	

# Summary of Readily Dispersable Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
H-3		9.22E5 dpm		181510-1 (soln)	
H-3		9.22E5 dpm		181510-2 (soln)	
H-3		9.22E5 dpm		181510-3 (soln)	
H-3		9.22E5 dpm		181510-4 (soln)	
H-3		9.22E5 dpm		181510-5 (soln)	
Hg-203	10/22/62	0.002		in 0.15 mls HNO3 soln	10/7/63
Kr-85		1.000E-04		gas diode	3/25/77
Kr-85		0.01		empty bottle	8/5/77
Mo-99/Tc-99	03/12/76	0.1		neutron type generator	
Na-22	09/17/69	1.000E-06		5 mls of liquid	6/3/75
Ni-63	10/21/77	0.015	High Pressure Ion Kinetics	Ni-63 electroplated to inside wall of customer supplied ferrule (not a sealed source)	
Ni-63	04/11/78	0.015	High Pressure Ion Kinetics	Ni-63 electroplated to inside wall of customer supplied ferrule (not a sealed source)	
Ni-63	10/11/78	0.015	High Pressure Ion Kinetics	Ni-63 electroplated to inside wall of customer supplied ferrule (not a sealed source)	
Ni-63				electron tube	7/29/92
P-32	08/28/74	0.015		in 10 mls 85% reagent grade phosphoric acid	
P-32	09/06/74	0.015	Fuel Cell	in 10 mls 85% reagent grade phosphoric acid	
P-32	08/28/74	0.015			2/1/75
P-32	09/06/74	0.015			2/1/75
P-32	09/06/74	0.015			2/1/75
P-32	01/05/78	0.05		10 mls H3P32O4	
P-32	01/23/78	0.05		5 mls H3P32O4	
P-32	06/16/77	0.09		3 mls H3P32O4	3/24/78

# Summary of Redily Dispersable Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Pb-210	08/10/64	0.0003			10/29/64
Pm-147		0.001		bag of waste	6/3/75
Pm-147	07/31/70	0.02		in 1N HCl	6/3/75
Pm-147	07/31/70	0.05		in 1N HCl	
Pm-147	07/31/70	0.05		in 1N HCl	
Pm-147	11/03/69	0.068		solid w/Zn target	
Pm-147		0.1			7/29/92
Pm-147	12/01/68	0.1		solid w/Cu target	
Pm-147	12/01/68	0.1		solid w/Ni target	
Pm-147		0.438			6/3/75
Pm-147		0.9		in 1N HCl	6/3/75
Pm-147	06/17/70	3.5	XRF - Eng. Cond. Monitor	in 1N HCl	6/3/75
Ra-226		7.989E-09		aluminum slag	3/17/98
Ra-226		2.000E-08		liquid	7/29/92
Ra-226		5.459E-06		aluminum slag	3/17/98
Ra-226	10/12/64	0.0004		4 blocks at 100E-6 uCi ea. Model 2253, S/N's 1-4	3/1/65
Ra-226		0.1			8/29/77
S-35	02/26/64	0.00005		in 2.5 mls H2SO4 soln	3/9/65
S-35	03/10/64	0.00005		in 8.5 mls H2SO4 soln	9/2/64
S-35	05/08/64	0.002		in 5 mls H2SO4 soln	9/2/64
S-35	05/15/64	0.002		in 2.5 mls H2SO4 soln	11/18/64
S-35	05/28/64	0.005		in 1 ml H2SO4 soln	3/9/65
Sm-153	11/19/62	0.05		in 5.7 mls HCl soln	4/30/63

# Summary of Redily Dispersable Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Physical and/or Chemical Form	Disposal Date
Sm-153	05/07/62	0.075		in 12.1 mls HCl soln	9/25/62
Sm-153	06/11/62	0.075		in 17.9 mls HCl soln	4/30/63
Sm-153	05/21/62	0.096		in 18.8 mls HCL soln	9/25/62
Sn-121	10/29/63	0.002		irradiated tetraphenyl tin	11/10/63
Sn-121	07/26/63	0.005		irradiated tetraphenyl tin powder	1/16/64
Sn-121	07/29/63	0.005		irradiated tetraphenyl tin powder	1/16/64
Sn-121	08/01/63	0.005		irradiated tetraphenyl tin powder	1/16/64
Sn-121	09/05/63	0.005		irradiated tetraphenyl tin powder	1/16/64
Sn-121	11/04/63	0.015		irradiated tetraphenyl tin powder	11/10/63
Sr-89	11/27/63	0.003		strontium oxide crystals in quartz tube	4/1/66
Sr-90		1.000E-06			7/29/92
Sr-90		0.08			6/3/75
Sr-90	06/10/63	0.116		powder sealed in SS cyl	6/23/67
Sr-90	06/10/63	0.12		powder sealed in SS cyl	6/23/67
Sr-90, Ti-204, Zr-90, Hf-181, Am-241		0.001		mixed isotope lab waste, cal stds	9/30/65
Sr-90/Y-90		0.001		vial w/wire	7/29/92
Ti-204		5.000E-05		fitting	7/29/92
Ti-204	08/07/63			in 2.95 mls HNO3 soln	10/12/64
Zr-90	12/04/63	0.07		irradiated alumina and zirconia powder (crucible material)	9/23/64
	11/19/62	1		in 0.5 mls HCl soln	4/1/63
		2			1/16/64
				plaster of paris	3/8/65

# Summary of Special Nuclear Material Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Pounds of elemental uranium	Disposal Date
U-235	03/23/73	7.202E-06	Radioisotope Lab	15g UF <sub>6</sub> (97.65% U-235 enriched)	2.24E-02	11/20/90
U-Dep	08/19/75	2.600E-06	Spectroscopic Studies	1g U <sub>3</sub> O <sub>8</sub> NBS standard 0.018 atom% U-235	1.87E-03	11/20/90
U-Dep	08/19/75		Spectroscopic Studies	1g U <sub>3</sub> O <sub>8</sub> NBS standard 0.4895 atom% U-235	1.87E-03	11/20/90
U-235	08/19/75		Spectroscopic Studies	1g U <sub>3</sub> O <sub>8</sub> NBS standard 1.004 atom% U-235	1.87E-03	11/20/90
U-235	08/19/75		Spectroscopic Studies	1g U <sub>3</sub> O <sub>8</sub> NBS standard 2.038 atom% U-235	1.87E-03	11/20/90
U-235	03/09/79	3.280E-05		1g U <sub>3</sub> O <sub>8</sub> NBS standard 49.696 atom% U-235	1.87E-03	11/20/90
U-233	10/10/79	9.700E-04		0.1179g U <sub>3</sub> O <sub>8</sub> (99.47% U-233 enriched)	2.20E-04	11/20/90
Pu-238	12/10/70	3.000E-02	Radioisotope Techniques	Sealed source (S/N 7720/6)		7/29/92
Pu-238	08/06/73	3.000E-02	Radioisotope	Sealed source (S/N 9283/2)		7/29/92
Pu-238		3.000E-02		9283/2	3.00E-02	7/28/92
Pu-238		3.000E-02		7720/6	3.00E-02	7/28/92
Total Elemental Uranium =					3.19E-02	

# Summary of Radiography Records

Isotope	Date Received	Activity (Ci)	Past usage (e.g. Project)	Description	Material Quantities	Disposal Date
Co-60	12/04/67	20.0		1017		01/31/68
Co-60	12/10/69	55.0		1332		06/11/70
Co-60	05/14/70	55.0	JT9D radiography	1339	1	06/11/70
Co-60	08/24/70	53.0	JT9D radiography	1339	1	10/23/70
Co-60	09/08/71	100.0		1369		11/08/71
Co-60	04/14/72	97.0		1419		07/17/72
Ir-192	02/28/66	105.0		693		07/19/67
Ir-192	07/30/66	111.0	TF33 isotope radiography	1081	111 Ci	07/19/67
Ir-192	12/20/66	100.0		1216		04/24/68
Ir-192	07/19/67	107.0		1770		07/15/68
Ir-192	11/24/67	104.0		2138		07/15/68
Ir-192	02/13/69	54.0		2893		08/19/69
Ir-192	04/04/69	98.0		3172	1	07/11/69
Ir-192	10/24/69	100.0		3694		10/25/69
Ir-192	05/14/70	80.0		4111		05/20/70
Ir-192	08/17/70	35.0		4111		08/25/70
Ir-192	08/25/70	100.0		4364		08/26/70
Ir-192	09/01/70	100.0	Radiography - JT9D	4395	100 Ci	06/03/75
Ir-192	02/22/71	33.0		4502		03/19/71
Ir-192	03/19/71	98.0		4619		07/09/71
Ir-192	06/21/71	75.0		4982		09/30/71
Ir-192	12/04/72	2.2		5353		12/04/72
Ir-192	12/01/72	100.0		6269		12/04/72
Ir-192	03/30/65	24.0		6795		09/21/65
Ir-192	04/23/64	100.0		6795		09/02/65
Ir-192	09/02/65	85.0		7380		03/15/66
Note: Radiography activities came under NRC license# 06-07522-03						
Period: 04/23/64 08/28/70						
5 Co-60 sources Period: 12/04/67 07/17/72 327.00 Ci						
18 Ir-192 sources Period: 04/23/64 06/03/75 1476.20 Ci						

Put into Underground Liquid Waste Retention Tank to be eventually released to the Sanitary Sewerage System

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Date into tank
Sm-153	05/07/62	0.075		in 12.1 mls HCl soln	09/25/62
Sm-153	05/21/62	0.096		in 18.8 mls HCL soln	09/25/62
Sm-153	11/19/62	0.050		in 5.7 mls HCl soln	04/30/63
Sm-153	06/11/62	0.075		in 17.9 mls HCl soln	04/30/63
					06/19/63
					06/20/63
					06/21/63
					06/21/63
Tm-170	03/11/63	2.0		in 1.9 mls HCl	06/22/63
					08/29/63
					11/27/63
					12/24/63
					09/24/64
S-35	03/10/64	5.00E-05		in 8.5 mls H2SO4 soln	09/02/64
Ti-204	08/07/63			in 2.95 mls HNO3 soln	10/12/64
C-14	08/07/63	4.49E-06		in 9.9 mls Na2CO3 soln	11/18/64
H-3	11/18/64	1.0000		as H2O	11/18/64
S-35	05/15/64	0.0020		in 2.5 mls H2SO4 soln	11/18/64

Put into Underground Liquid Waste Retention Tank to be eventually released to the Sanitary Sewerage System

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Date into tank
Au-199, Pt-197		2.20E-09		Dilutions of irradiated Pt pwd (2nd irradiation)	11/06/69
Pt-197, Pt-199, Au-198		0		930 mls of H <sub>2</sub> PO <sub>4</sub> w/residual irradiated Pt electrodes	02/24/70
Cr-51	09/09/64	0.002	Tracer experiments of microcircuit surface contamination	sodium chromate soln	



Date tank released to Sanitary	Tank Volume (gallons)	Activity (uCi/cc)	Activity dumped with dilution factor (uCi/cc)	Regulated Isotope	Associated Limit (uCi/cc)
4/19/65					
7/1/65					
8/19/65					
10/15/65					
11/9/65					
12/12/68	200	7.60E-05	2.70E-07	unk isotope	4.00E-07
4/18/69	120	2.50E-05	4.62E-08		
6/30/69	116	6.40E-04	1.34E-07	Kr-85	9.50E-05
11/10/69	140	1.82E-05	4.62E-08	Kr-85	9.00E-05
2/2/70	136	5.00E-05	1.23E-07	Kr-85	9.00E-05
11/30/70	123	1.56E-04	3.50E-07		
3/5/71	157	1.40E-04	3.27E-07	Pm-147	6.00E-03
				unk isotope	4.00E-07
7/25/74	250	5.50E-05	1.80E-07	Pm-147	6.00E-03
				unk isotope	4.00E-07

Summary of Disposal Records pursuant to 10 CFR 20.2005

Isotope	Date Received	Activity (Ci)	Past usage (e.g.Project)	Physical and/or Chemical Form	Calc Act Remaining (Ci)	Half-Lives	Disposal Date
Sn-121	10/29/63	0.002	buried by L. Packer at PWA/Florida Research & Development Center (0 activity)	irradiated tetraphenyl tin	1.23E-06		11/10/63
Sn-121	11/04/63	0.015	buried by L. Packer at PWA/Florida Research & Development Center (0.22 mCi)	irradiated tetraphenyl tin powder	3.72E-04		11/10/63
Xe-133	07/06/64	2.00	implanted into rats - held to decay in rats to no activity - rats buried	gas	1.54E-12	40.24	02/02/65
Xe-133	08/06/64	2.00	prepared into seeds, decaying there - rats buried	gas	4.67E-13	41.96	03/14/65
Xe-133	09/08/64	3.00	prepared into seeds, decaying there - rats buried	gas	5.50E-11	35.67	03/14/65

## Summary of Disposal Records pursuant to 10 CFR 20.2103(b)(4)

Isotope	Date Received	Activity (Ci)	Description of Release	Physical and/or Chemical Form	Release Date
Kr-85	05/10/65	200	108.4 Ci lost to atmosphere	transferred to krypton rig	
Kr-85	08/18/67	0.003	released to atmosphere	25 liters at 0.1 mCi/l (calibration standard)	09/08/67
Kr-85	11/21/67	0.011	released to atmosphere after each calibration	calibration gas for effluent counting	
Xe-133	09/28/62	1.00	2E3 uCi controlled release in hood with rated flow of 1200 CFM	gas	11/16/62
Xe-133	11/29/62	1.00	1E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	01/20/63
Xe-133	02/04/63	1.00	2.35E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	02/15/63
Xe-133	02/20/63	1.00	5E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	03/16/63
Xe-133	03/25/63	1.00	6.4E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	04/15/63
Xe-133	04/25/63	5.00	3.6E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	05/15/63
Xe-133	05/15/63	5.00	1E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	06/14/63
Xe-133	06/17/63	5.00	7.5E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	07/19/63
Xe-133	11/28/63	5.00	5.31E2 uCi controlled release in hood with rated flow of 1200 CFM	gas	02/06/64
Xe-133	01/28/64	5.00	1E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	03/30/64

## Summary of Disposal Records pursuant to 10 CFR 20.2103(b)(4)

Isotope	Date Received	Activity (Ci)	Description of Release	Physical and/or Chemical Form	Release Date
Xe-133	02/14/64	3.00	1E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	03/20/64
Xe-133	03/31/64	2.00	8.7E2 uCi controlled release in hood with rated flow of 1200 CFM	gas	05/29/64
Xe-133	05/08/64	2.00	2.5E3 uCi controlled release in hood with rated flow of 1200 CFM	gas	06/30/64
Xe-133	07/02/64	5.00	6E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	07/17/64
Xe-133	08/03/64	5.00	5E2 uCi controlled release in hood with rated flow of 1200 CFM	gas	10/12/64
Xe-131	08/14/64	8.80E-04	6.6E-1 uCi controlled release in hood with rated flow of 1200 CFM	gas	12/17/64
Xe-131	10/12/64	3.00	2.2E4 uCi controlled release in hood with rated flow of 1200 CFM	gas	11/09/64
			2.51E3 uCi controlled release in hood with rated flow of 1200 CFM		12/02/64
			3.02E-3 uCi controlled release in hood with rated flow of 1200 CFM		03/14/65
Xe-131	11/09/64	2.00	2.5E3 uCi controlled release in hood with rated flow of 1200 CFM	gas	12/04/64
			3.86E2 uCi controlled release in hood with rated flow of 1200 CFM		12/22/64
Xe-131	11/23/64	3.00	7.69E5 uCi controlled release into hood	gas	11/24/64
Xe-131	01/18/65	3.00	8.77E5 uCi controlled release in hood with rated flow of 1200 CFM	gas	01/18/65
			7.69E5 uCi controlled release in hood with rated flow of 1200 CFM		01/19/65
			6.74E5 uCi controlled release in hood with rated flow of 1200 CFM		01/20/65

Summary of Disposal Records pursuant to 10 CFR 20.2103(b)(4)

Isotope	Date Received	Activity (Ci)	Description of Release	Physical and/or Chemical Form	Release Date
Xe-131	01/25/65	1.80	3E3 uCi controlled release into hood with rated flow of 1200 CFM	gas	01/29/65
Xe-131	08/30/65	3.00	made seeds, oil tagging experiment. 577 mCi controlled release into hood with rated flow of 1200 CFM	gas	08/31/65
			made seeds, oil tagging experiment. 88.3 uCi, controlled release into hood with rated flow of 1200 CFM		10/08/65
			made seeds, oil tagging experiment. 12 uCi controlled release into hood with rated flow of 1200 CFM		10/15/65
Xe-131	12/17/66	4.00	controlled release in hood	gas (wall thickness measurement)	04/19/67
H-3	11/18/64	1.00	1 ml (0.5 Ci) allowed to evaporate over a period of days	gas	11/18/64

This is to acknowledge the receipt of your letter/application dated

9/15/2004, and to inform you that the initial processing which includes an administrative review has been performed.

☒ TEAM 06-07522-01 There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

☐ Please provide to this office within 30 days of your receipt of this card

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned Mail Control Number 135711.  
When calling to inquire about this action, please refer to this control number.  
You may call us on (610) 337-5398, or 337-5260.

Anthony Frigiani  
United Technologies Research Center  
411 Silver Lane, M/S 129-57  
East Hartford, CT 06108

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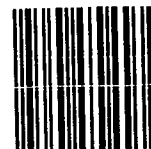
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:  Status Code: 0
:  Fee Category: 3B 3M
:  Exp. Date: 20111031
:  Fee Comments: 1D/STOR ONLY EFF 9/16/91
:  Decom Fin Assur Req'd: N
:
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A. REGION *I*

Applicant/Licensee: UNITED TECHNOLOGIES CORP.  
Received Date: 20040917  
Docket No: 3003795  
Control No.: 135711  
License No.: 06-07522-01  
Action Type: Termination

Amount: \_\_\_\_\_  
Check No.: \_\_\_\_\_

Signed M. A. Perkins  
Date 9/2/44

1. Fee Category and Amount: \_\_\_\_\_

Amendment \_\_\_\_\_  
Renewal \_\_\_\_\_  
License \_\_\_\_\_

Signed \_\_\_\_\_  
Date \_\_\_\_\_