

Douglas Decker
6710 Quality Way
Portage, Michigan 49002

July 28, 2017

Materials Licensing Section
U.S. Nuclear Regulatory Commission, Region III
2443 Warrenville Road, Suite 210
Lisle, IL 60532-4352

Control number- 594576

Dear Colleen Casey,

I am providing supplementary material to NRC form 314 originally provided on April 19, 2017. Specifically, wipe test results from a sink used for disposal of H³ on 4/29/2009 (0.226 mCi) and on 5/4/2009 (0.1 mCi). Additionally, a request was made to further survey the specific locations in the laboratory where C¹⁴ and H³ were used. This included fixed bench locations and ventilation systems used when working with material. The survey was done using a Ludlum 2360 instrument equipped with a 43-93 probe calibrated for C¹⁴. The results of wipe testing of the sink used for H³ disposal showed that at all locations wipe tested the dpm were below the 100 dpm action level. Also, all fixed bench space locations and all ventilation systems surveyed using the Ludlum survey meter with the 43-93 probe showed no detectable cpm above background. A copy of the survey report with all survey locations and results is included in the Fax sent with this letter. Please let me know if you have any further questions, and I thank you for your guidance in helping me provide the information needed.

Thank you,

Douglas E. Decker, RSO

dedecker@pharmoptima.com

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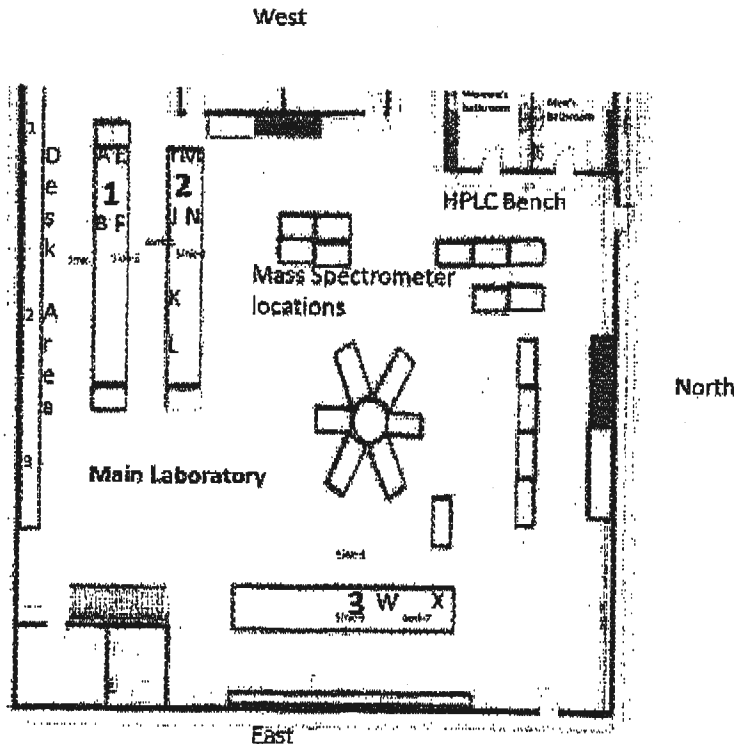
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Date- 26 July, 2017

**Laboratory Survey Using Ludlum 2360 Meter Equipped with 43-93 Probe
and Wipe Testing of a Sink Used for Disposal of H³**

The NRC requested that I provide them with more information about the specific fixed bench space locations and ventilation systems where C¹⁴ and H³ were used. I have previously provided wipe test data and this survey will provide data using a Ludlum 2360 meter serial number 193629 equipped with a 43-93 probe serial number 299660. The meter and probe were provided by Energy Solutions and the calibration data for C¹⁴ was provided with the instrument (calibration date 7/24/17). The instrument was set to 1x and time at 1 minute. The background cpm for the instrument held about 1 inch from a cardboard surface (control surface) ranged from 80-120 cpm. **All fixed bench space locations and floor surface areas below the bench locations showed no measurable cpm above background.** Additionally, ventilation systems surveyed where C¹⁴ and H³ were used (see map below) showed **no measurable cpm above background.**

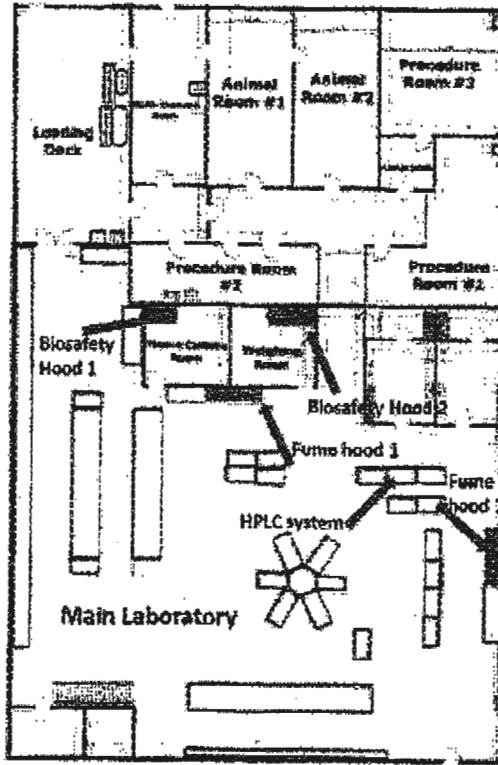
Note: The map shows the fixed bench space locations (1A, 1B, 1E, 1F, 2I, 2K, 2L, 2M, 2N, 3W, and 3X) in the Main Laboratory where C¹⁴ and H³ were used. The bench areas were surveyed with a Ludlum 2360 meter equipped with a 43-93 probe (see attached calibration records) and no measurable cpm above background was detected. Additionally, floor surface areas at the indicated bench surface were surveyed and no detectable cpm above background was detected.

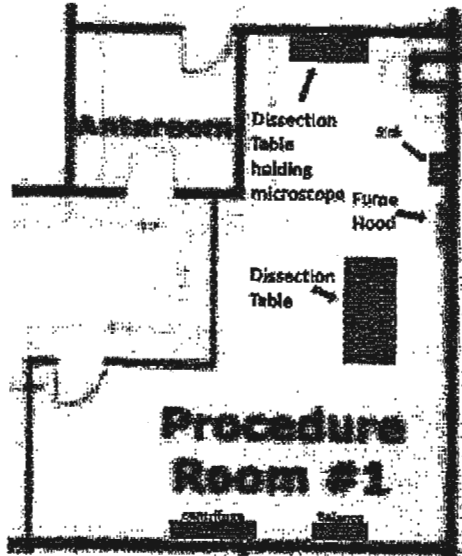


Note:

Laboratory ventilation systems were also surveyed where C^{14} and H^3 were used. These included a Biosafety hood in culture room, Biosafety hood 2 in the weighing room which was not included in previously surveyed material, Fume hood 1, and Fume hood 2. The bench surface of the hoods and walls were surveyed and no detectable cpm above background were observed.

A survey was also conducted on the HPLC system used for work with C^{14} and H^3 . No detectable cpm above background was detected. The floor surface area around the HPLC system was also surveyed and no detectable cpm above background was observed.





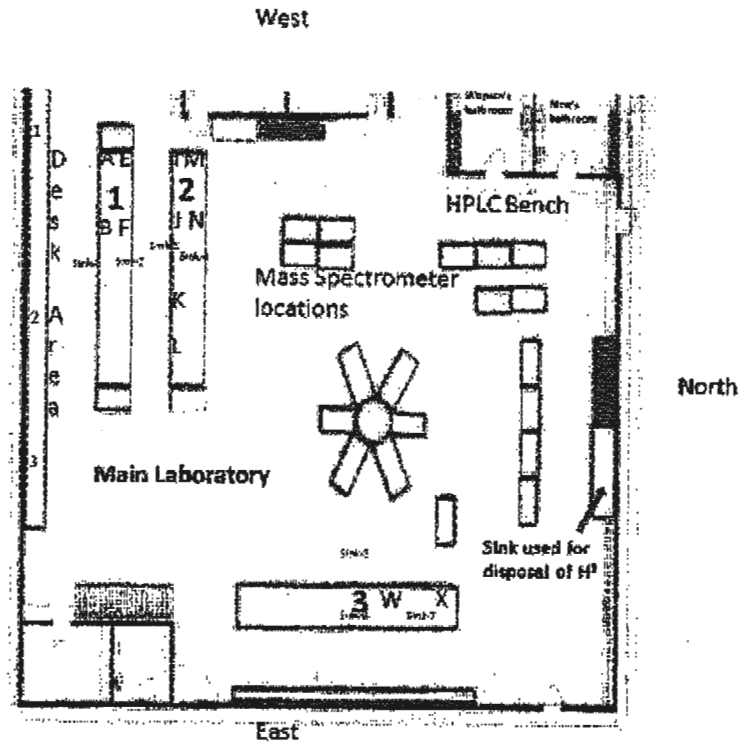
Note: The fume hood in procedure room 1 where C^{14} and H^3 were used was also surveyed using the Ludlum 2630 meter equipped with a 43-93 probe. No measurable cpm above background were detected.

A dissection table and a dissection table holding a microscope where C^{14} and H^3 were used were also surveyed and no detectable cpm above background was observed. Floor area around the dissection tables were also surveyed and no detectable cpm above background was detected.

Wipe test reference number and location corresponding to Survey Results with Ludlum Meter and Probe		
Wipe test sample number	Wipe test location	Corresponding survey result with Ludlum meter and probe
1	Fixed bench 1A	no detectable cpm above background
2	Fixed bench 1B	no detectable cpm above background
7	Fixed bench 1E	no detectable cpm above background
8	Fixed bench 1F	no detectable cpm above background
13	Fixed bench 2I	no detectable cpm above background
14	Fixed bench 2J	no detectable cpm above background
17	Fixed bench 2K	no detectable cpm above background
18	Fixed bench 2L	no detectable cpm above background
19	Fixed bench 2M	no detectable cpm above background
20	Fixed bench 2N	no detectable cpm above background
35	Fixed bench 3W	no detectable cpm above background
38	Fixed bench 3X	no detectable cpm above background
63	Biosafety hood 1	no detectable cpm above background
not previously surveyed	Biosafety hood 2	no detectable cpm above background
60-61	Fume hood 1	no detectable cpm above background
68-69	Fume hood 2	no detectable cpm above background
70-73	HPLC system	no detectable cpm above background
86-87	Fume hood in Procedure room 1	no detectable cpm above background
88	dissection table with microscope	no detectable cpm above background
89	dissection table with microscope	no detectable cpm above background

An additional request to provide more information relating to disposal of H^3 down a sink was also requested. On 4/29/2009, 0.226 mCi of H^3 was disposed down a sink and on 5/4/2009 0.1 mCi of H^3 was disposed down the same sink. The sink used for disposal was located against the North wall of the Main Laboratory and is shown on the map below. The sink was wipe tested and the results **show no DPM above the action level of 100 dpm**. See count data below. This was the only sink used to dispose radioactive material.

Note: The map shows the location of the sink against the North wall of the Main Laboratory used for disposal of H^3 on 4/29/2009 and 5/4/2009



SYSTEM NORMALIZED
 C14 IPA DATA PROCESSED - 26-Jul-2017 10:11
 C14 EFF (0-156 keV) = 99.42 %
 C14 CH1 SQUARE IPA DATA PROCESSED - 26-Jul-2017 10:11
 C14 CH1 Square = 15.35
 H3 IPA DATA PROCESSED - 26-Jul-2017 10:13
 H3 EFF (0-18.6 keV) = 61.85 %
 H3 CH1 SQUARE IPA DATA PROCESSED - 26-Jul-2017 10:13
 H3 CH1 Square = 18.58
 H3G IPA DATA PROCESSED - 26-Jul-2017 11:23
 H3G (0-18.6 keV) = 19.08 cpm
 H3G (0-156 keV) = 21.87 cpm
 C14 E-276 (1-156 keV) = 519.79
 H3 E-276 (1-18.6 keV) = 285.76

Wipe test results of sink used to dispose H³ on 4/29/2009 and 5/4/2009

Column header ID

- PID- Cassette ID
- S#- sample number from key page
- Time- 5 minute count time
- CPMA- H³ channel cpm
- CPMB- C¹⁴ channel cpm
- CPMC- channel not used
- DPM1- H³ channel DPM
- DPM2- C¹⁴ channel DPM
- ISIE- Spectral index of external standard
- Flag- no flags observed

REPORT OF ANALYSIS
 ANALYSIS OF H³ AND C¹⁴ BY THE
 ANALYSIS OF H³ AND C¹⁴ BY THE
 ANALYSIS OF H³ AND C¹⁴ BY THE
 TIME = 5.240
 DATE = 04/29/09
 TIME = 11:23:00
 DATE = 05/04/09

PID	S#	TIME	CPMA	CPMB	CPMC	DPM1	DPM2	ISIE	FLAG
001	1	5.000	14.13	19	0.000	30	117.000	0.000	
002	2	5.000	17.000	18	0.000	27	117.000	0.000	

Sink wipe test locations

- Sample 1- front top of sink
- Sample 2- back top of sink
- Sample 3- front side of sink basin
- Sample 4- back side of sink basin
- Sample 5- right side of sink basin
- Sample 6- left side of sink basin
- Sample 7- floor of sink basin
- Sample 8- six inches into sink drain

003	3	5.000	12.000	16	0.000	26	117.000	0.000	
004	4	5.000	15.000	17	0.000	25	117.000	0.000	
005	5	5.000	13.000	17	0.000	29	117.000	0.000	
006	6	5.000	12.000	16	0.000	28	117.000	0.000	
007	7	5.000	13.000	18	0.000	23	117.000	0.000	
008	8	5.000	12.000	16	0.000	26	117.000	0.000	

All wipe test results show DPM below the action level of 100 DPM. No detectable contamination

PACKARD 1900CA

LIQUID SCINTILLATION COUNTER

SKM NORMALIZATION AND CALIBRATION

SYSTEM NORMALIZED

C14 IPA DATA PROCESSED - 26-Jul-2017 10:01

C14 Eff (0-156 keV) = 95.42 %

C14 CHI SQUARE IPA DATA PROCESSED - 26-Jul-2017 10:11

C14 Chi Square = 15.53

H3 IPA DATA PROCESSED - 26-Jul-2017 10:13

H3 Eff (0-18.6 keV) = 61.89 %

H3 CHI SQUARE IPA DATA PROCESSED - 26-Jul-2017 10:23

H3 Chi Square = 18.38

BKG IPA DATA PROCESSED - 26-Jul-2017 11:23

Bkg (0-18.6 keV) = 15.08 com

Bkg (0-156 keV) = 21.87 com

C14 E²/B (1-156 keV) = 519.79

H3 E²/B (1-18.6 keV) = 253.76

Protocol #: 5 Name: C14/H3 Dual 26-Jul-2017 11:29
 Region A: LL-UL= 0.0-12.0 Lcr= 0 Bkg= 0.00 %2 Sigma=2.00
 Region B: LL-UL=12.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=2.00
 Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
 Time = 5.00 GIF = tSIE/AEC ES Terminator = Count
 Dual C14/H3 curve 01MAY2014

Conventional DPM
 Nuclide 1 = 219443 Nuclide 2 = 126029
 Data/Application Drive & Path = A:/
 Save Data Filename = SDATA5.DAT

H³ CHANNEL
 ↓

AG	PID	S#	TIME	CPMA	CPMB	CPMC	DPM1	DPM2	tSIE	FL
	20	1	5.00	14.11	19	0.00	30	22.29	483.	
	20	2	5.00	12.47	16	0.00	27	17.84	481.	
	20	3	5.00	12.10	16	0.00	26	18.35	476.	
	20	4	5.00	15.42	17	0.00	35	18.48	477.	
	20	5	5.00	13.07	17	0.00	29	19.50	455.	
	20	6	5.00	12.96	16	0.00	29	18.15	469.	
	20	7	5.00	13.71	19	0.00	33	21.84	413.	
	20	8	5.00	12.71	16	0.00	28	19.24	465.	

RESULTS OF WIPE TEST OF SINK
 USED TO DISPOSE H³ ON
 4/29/2009 - 5/4/2009



**CALIBRATION
CERTIFICATE**

EnergySolutions Instrument Services
 1570 Bear Creek Road
 Oak Ridge, TN 37830
 Phone: (877) 462-4873
 Email: ISFstaff@energysolutions.com

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION			DETECTOR INFORMATION			
Customer Name: EnergySolutions Services, Inc.			Manufacturer: Ludlum			
Address: 1570 Bear Creek Road, Oak Ridge, TN 37830			Detector Model: 43-93			
Contact Name: John Barncord			Serial Number: 299660			
Customer Purchase: Order Number: N/A	Work Order Number: 2017-15485		Evaluation Method: Source			
DETECTOR EVALUATION INFORMATION						
Source Nuclide	Serial Number	Activity (dpm)	2 Pi Emissions	Net Response (cpm)	4pi Eff (%)	2pi Eff (%)
C-14	010002	259,906	72,505	9450	3.63	13.3
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCREENER INFORMATION			DETECTOR INFORMATION			
Model	Serial Number	Due Date	Background	Operating Voltage	Threshold	
2360	193629	10/28/17	1	775V	Alpha (120 mV)	
2360	193629	10/28/17	126	775V	Beta (3.5-30 mV)	
ATTACHMENTS						
N/A						
COMMENTS			LINEARITY TEST (Gross Counts)			
Calibrated with 5 ft. cable. Efficiencies performed on contact. Calibrated in accordance with original equipment technical manual. Background counts were performed using a 5 minute count.			Count 1 (Toe)	N/A		
			Count 2 (Mid)	N/A		
			Count 3 (Heel)	N/A		
			Average	N/A		
			Pass/Fail	N/A		
STATEMENT OF CERTIFICATION						
We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector).						
Detector Certified By:			Reviewed By:		Date: 7-24-17	
Certification Date: 7/24/17			*Certification Due (6mo): 1/24/18 *Certification Due (12mo): 7/24/18			

* Calibration due date is dependent on users regulatory requirements.



**CALIBRATION
CERTIFICATE**

EnergySolutions Services, Inc.
1570 Bear Creek Road
Oak Ridge, TN 37830
Phone: (877) 462-4873
Fax: (865) 220-1346

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: EnergySolutions Services, Inc.		Manufacturer: Ludlum	
Address: 1570 Bear Creek Road, Oak Ridge, TN 37830		Model: 2360	Serial Number: 193629
Contact Name: Tony Riggs		Probe: 43-93	Serial Number: 299660
Customer Purchase Order Number: N/A	Work Order Number: 2816-15095	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION								
Instrument Range	Calibration Standard Value (CPM)	Rateometer Response ($\pm 10\%$ of Standard Values)		Calibration Standard Value	Time Base (minutes)	Tolerances (CPM) $\pm 2\%$	Scaler Response (CPM)	
		As Found	As Left				As Found	As Left
X 1	100	95	95	40,000 CPM	0.1	3,920 - 4,080	4,005	4,005
X 1	250	245	250	40,000 CPM	0.5	19.6K - 20.4K	20,024	20,024
X 1	400	395	405	40,000 CPM	1	39.2K - 40.8K	40,049	40,049
X 10	1,000	950	950	40,000 CPM	2	78.4K - 81.6K	80,096	80,096
X 10	2,500	2,450	2,500					
X 10	4,000	3,950	4,050					
X 100	10,000	9,500	9,500					
X 100	25,000	24,500	25,000					
X 100	40,000	39,500	40,500					
X 1000	100,000	95,000	95,000	Calibrated in accordance with OEM Technical Manual				
X 1000	250,000	245,000	250,000					
X 1000	400,000	395,000	405,000					

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument		Reviewed By: <i>[Signature]</i>	Date: 10/28/16
Calibrated By: <i>[Signature]</i>		*Calibration Due (6mo): 04/28/2017	
Calibration Date: 10/28/2016		*Calibration Due (12mo): 10/28/2017	

*Calibration due date is dependant on users regulatory requirements.



Model: **2360**

Serial Number: **193629**

M&TE				Environmental Conditions			
Volt Meter	ID#: 94710023	Cal Due: 02/26/17		Barometer	ID#: 3590	Cal Due: 11/03/16	
Pulser	ID#: 120935	Cal Due: 06/27/17		Thermometer	ID#: 3590	Cal Due: 11/03/16	
Humidity	ID#: 992290	Cal Due: 01/19/17		Temp: 22.9 °C	Pressure: 746 mmHg	Humidity: 37.9 %	
Special Test							
Mechanical Zero		Sat (✓) Unsat ()		Geotropism		Sat (✓) Unsat ()	
LCD Display Check		Sat (✓) Unsat ()		Audio Check		Sat (✓) Unsat ()	
BAT Check		Sat (✓) Unsat ()		Low BAT Set		Sat (✓) Unsat ()	
Reset		Sat (✓) Unsat ()					
HV Analog Display		Sat (✓) Unsat ()		As Found		As Left	
High Voltage Calibration (± 10%)				Alpha Sensitivity = 134 mV		Alpha Sensitivity = 120 mV	
Voltage	Tolerance	As Found	As Left	Beta Sensitivity = 3.1 mV		Beta Sensitivity = 3.5 mV	
500	450 - 550	506	506	Beta Window = 31.2 mV		Beta Window = 30.0 mV	
1,000	900 - 1,100	985	985	Beta Setpoints – Pulser counts detected at 3.5 mV ± 1 mV and shut off at 30 mV for beta. For Alpha channel counts detected at 120 mV and above.			
1,500	1,350 - 1,650	1,486	1,486				
H.V. Set With Detector Not Connected				Overload to be set with detector to be used			
COMMENTS							
<p>Calibrated in accordance with OEM Technical Manual</p> <p>See detector certificate for High Voltage setting</p> <p>**Calibrated with 5 ft. cable**</p>							
Instrument				Date: 10/28/16			
Calibrated By: <i>Michelle Yoner</i>				Reviewed By: <i>J. Robinson</i>		Date: 10/28/16	
Calibration Date: 10/28/2016				*Calibration Due (6mo): 04/28/2017			
				*Calibration Due (12mo): 10/28/2017			

* Calibration due date is dependant on users regulatory requirements.



**CALIBRATION
CERTIFICATE**

EnergySolutions Instrument Services
 1570 Bear Creek Road
 Oak Ridge, TN 37830
 Phone: (877) 462-4873
 Email: ISSstaff@energysolutions.com

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		DETECTOR INFORMATION	
Customer Name: EnergySolutions Services, Inc.		Manufacturer: Ludlum	
Address: 1570 Bear Creek Road, Oak Ridge, TN 37830		Detector Model: 43-93	
Contact Name: Tony Riggs		Serial Number: 299660	
Customer Purchase Order Number: N/A	Work Order Number: 2016-15095	Evaluation Method: Source	

DETECTOR EVALUATION INFORMATION						
Source Nuclide	Serial Number	Activity (dpm)	2 PI Emissions	Net Response (cpm)	4pi Eff (%)	2pi Eff (%)
Th-230	119738	18,597	8,639 / min	3,446	18.5	39.9
Pu-239	071601	23,887	12,060 / min	5,833	24.4	48.4
Tc-99	051304	24,330	13,380 / min	3,101	12.7	23.2
SrY-90	101502	43,698	24,983 / min	12,712	29.1	50.9

SEALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background	Operating Voltage	Threshold
2360	193629	10/28/17	3	775V	Alpha (120 mV)
2360	193629	10/28/17	172	775V	Beta (3.5 - 30 mV)

ATTACHMENTS					
Voltage Plateau: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Cross Talk Evaluation: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			

COMMENTS	LINEARITY TEST (Gross Counts)	
Calibrated with 5 ft. cable and efficiency's performed on contact. Linearity test performed with Tc-99, #051304. Calibrated in accordance with original equipment technical manual. Background counts were performed using a 5 minute count.	Count 1 (Toe)	3,176
	Count 2 (Mid)	3,301
	Count 3 (Heel)	3,342
	Average	3,273
	Pass/Fail	PASS (+/-10% Tolerance)

STATEMENT OF CERTIFICATION

We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturer's published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector).

Detector	Certified By: <i>Mike Yoner</i>	Reviewed By: <i>Jill Dobbins</i>	Date: 10/28/16
Certification Date: 10/28/2016	* Certification Due (6 mo.): 04/28/2017 * Certification Due (12 mo.): 10/28/2017		

Calibration due date is dependent on users regulatory requirements.



**CALIBRATION
CERTIFICATE**

EnergySolutions Services, Inc
1570 Bear Creek Road
Oak Ridge, TN 37830

Phone: (877) 462-4873
Fax: (865) 220-1346
Email: Isfstaff@energysolutions.com

<http://www.energysolutions.com/>

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION				INSTRUMENT INFORMATION			
Customer Name: EnergySolutions				Manufacturer:			
Address: 1570 Bear Creek Rd. Oak Ridge, TN 37830				Model:	2360	S.N.	193629
Contact Name: Tony Riggs				Probs:	43-93	S.N.	299660
Customer PO No.:	N/A	Work Order Number:	2016-15095	Calibration Method:		Source	

Source Information

	Isotope	Source ID	Certification Date	Activity (dpm)
α Source	Pu-239	071601	7/25/16	23,887
β Source	Tc-99	051304	5/15/13	24,330

Model: 43-93 High Voltage Plateau with cross-hair

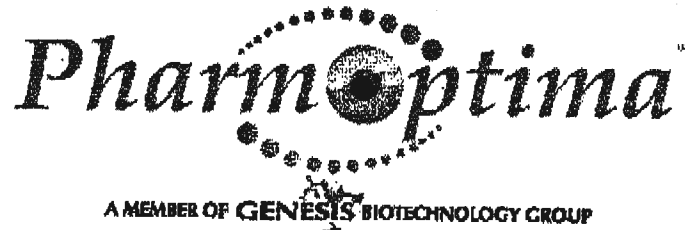
Operating Voltage	High Voltage	Background		Alpha Source		Beta Source		Total		Efficiency	
		Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
	725	2	84	5,176	267	7	1,717	3.59%	0.31%	21.66%	6.71%
	750	3	126	5,653	316	5	2,529	3.42%	0.08%	23.65%	9.88%
SET	775	0	181	5,688	368	5	3,298	3.40%	0.16%	23.81%	12.81%
	800	2	227	5,851	442	7	3,975	3.82%	0.13%	24.49%	15.40%

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Comments:

Calibrated By: Mike Yarn Reviewed By: Jeff Dickerson Date: 10/28/16
 Calibration Date: 10/28/16 Calibration Due: 10/28/17



Fax

Date: [July 28, 2017]
 Subject: [Supplementary material for NRC form 314]
 To: [Colleen Casey]
 Phone: [630-829-9841]
 Fax: [630-515-1078]
 From: [Douglas Decker]
 Phone: [269-492-3886]
 Fax: [269-329-4390]
 No. of pages: [No. of pages 14]

Message:

[Supplementary information for form 314 control # 594576]

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