Esperion Therapeutics

June 26, 2015

Peter Lee, PhD
United States Nuclear Regulatory Commission
Region III Materials Licensing Branch
801 Warrenville Road
Lisle, IL 60532-4351

Subject: License Termination Request (License Number 21-32115-02)

Dear Dr. Lee:

This letter is to request termination of radioactive materials license number 21-32115-02 authorizing unrestricted release of the Esperion Therapeutics Plymouth Facility for return to the landlord. The facility is located at 46701 Commerce Center Drive in Plymouth MI.

Licensed activities have ceased and the facility has undergone decommissioning. Decommissioning was conducted under the provisions of the Chase Environmental Group Commonwealth of Kentucky radioactive materials license and in accordance with a MARSSIM-based Decommissioning Work Plan. The enclosed Final Status Report provides conclusive evidence that the facility meets the criteria for unrestricted use specified in 10 CFR 20 Subpart E. Dose modeling indicates that the TEDE to the maximally exposed individual is 0.0015 mrem/year (<0.006% of the NRC release criterion of 25 mrem/yr).

I have personally inspected the facility and verified that all licensed radioactive material and all radioactive markings have been removed from the facility. I appreciate your time and efforts with this matter and look forward to hearing back from you. If you have any questions or concerns, please contact me at 734-887-3922.

Sincerely yours,

Clay T. Cramer
Radiation Safety Officer

3891 Ranchero Drive | Suite 150 | Ann Arbor, MI 48108

Esperion Therapeutics, Inc. Decommissioning Final Status Report

NRC License Number 21-32115-02

June 15, 2015

Prepared:	Mike Culp	Project Manager	Date:	6-15-15
Approved:	Dave Culp	Radiological Engineer	Date:	6-24-15
Approved:	Clay Cramer	Esperion RSO	Date:	6.25-15

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TABLE OF CONTENTS

TABLES

APPENDICES

ACRONYMS

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
DCGL	Derived Concentration Guideline Level
$DCGL_{EMC}$	Derived Concentration Guideline Level – Elevated Measurement Comparison
$DCGL_W$	Derived Concentration Guideline Level – Wilcoxon Rank Sum
DWP	Decommissioning Work Plan
DQO	Data Quality Objective
DSV	Default Screening Value
FSS	Final Status Survey
FSSR	Final Status Survey Report
LBGR	Lower Bound of the Gray Region
LSC	Liquid Scintillation Counter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
MDCR	Minimum Detectable Count Rate
NRC	U.S. Nuclear Regulatory Commission
NIST	National Institute of Standards and Technology
QA	Quality Assurance
TEDE	Total Effective Dose Equivalent

1.0 INTRODUCTION

Esperion Therapeutics, Inc. (Esperion) has decided to permanently cease licensed activities at their leased facility located at 46701 Commerce Center Drive in Plymouth MI. Esperion will decommission the facility for unrestricted use and terminate US Nuclear Regulatory Commission (NRC) license number 21-32115-02. A site satellite photo is presented in Appendix A.

Facilities include a research laboratory, offices, and other support areas. Radioactive materials used at the facilities consisted of beta emitting radionuclides for research and development. These included C-14, H-3, P-32, and S-35. Based on an analysis of the default screening values (DSVs), quantities used, physical forms, half-lives, and receipt and distribution records, only C-14 and H-3 are of concern for decommissioning.

Decommissioning activities were conducted under the Chase Commonwealth of Kentucky radioactive materials license number 201-605-90, utilizing a reciprocal agreement with the NRC, and in accordance with a decommissioning work plan (DWP). The DWP was developed using the guidance provided in NUREG 1757, "*Consolidated NMSS Decommissioning Guidance*"; and NUREG 1575, "*Multi-Agency Radiation Survey and Site Investigation Manual*" (MARSSIM). Final status surveys (FSS) were designed to implement the protocols and guidance provided in MARSSIM to demonstrate compliance with NRC default screening values (DSV). These methods ensured technically defensible data were generated to aid in determining whether or not the site meets the release criteria for unrestricted use specified in 10 CFR 20 Subpart E.

Esperion established conservative ALARA goals for building structural surfaces and systems based on the release criteria specified in NUREG 1556, Volume 7, Table Q.2, "Acceptable Surface Contamination Levels for Equipment." Specifically, the following surface contamination goals were used:

- 5,000 dpm/100 cm^2 total surface contamination
- 500 dpm/100 cm^2 removable surface contamination

On-site scoping surveys were performed under the facility license on May 19-20, 2015 and on-site decommissioning activities were performed under the Chase license on June 9-10, 2015. Facility characterization surveys identified one small discrete location on building structural surfaces and one vacuum system nozzle with residual radioactivity above the investigation levels. Areas of elevated activity were remediated for ALARA purposes as described in section 19.0.

This report presents sufficient data to conclude the facility is suitable for unrestricted release in accordance with NRC requirements. Final status surveys demonstrate that building structural surfaces and systems included in the scope of this report are below release criteria and are suitable for unrestricted release. All final status surface activity measurements were a small fraction of the DSVs. Based on the Building Occupancy Scenario of NRC DandD

dose modeling software Version 2.1, **the Total Effective Dose Equivalent (TEDE) to an average member of the critical group is 0.0015 mrem/year (<0.006% of the release criterion of 25 mrem/yr).**

2.0 FACILITY DESCRIPTION AND HISTORY

The building is approximately a 60,000 ft^2, one-story steel frame building with concrete, glass and metal exterior walls. Esperion leases a small portion of the building to conduct licensed operations. Interior walls are made of sheetrock or concrete block. Floors are poured concrete with various coverings. Floors in hallways and laboratory areas are covered in vinyl tile or vinyl sheeting. Office area floors are carpeted. A penthouse mechanical room houses heating, ventilation and air conditioning equipment.

The laboratory drain system consists of sink and cup sink drains located in fume hoods and casework throughout the laboratory space. Drains discharge directly from the building without retention or treatment. The central vacuum system consists of nozzles located throughout the laboratory space, and a pump and accumulator located in a mechanical room. Exhaust ventilation is provided primarily via the fume hood exhausts with various room exhausts provided in the ceiling. Two fans located in the penthouse exhaust air outside via stacks.

A building floor plan is provided as Appendix A. Esperion conducts licensed operations in Suite B-1. A floor plan of the Esperion area is presented in Appendix B.

2.1 Potential Contaminants

The table below lists the nuclides used in dispersible form. This list was compiled through review of radionuclide receipt and distribution records. Even though S-35 was authorized on the Esperion NRC license, S-35 was never possessed or used at the facility.

Table 2-1: Radionuclides Used in Dispersible Form

Nuclide	Half-life (years)	Predominant Emission
C-14	5.7E+03	Low Energy Beta
H-3	1.2E+01	Low Energy Beta

2.2 License History

License number 21-32115-02 first authorized licensed activities on April 23, 2009. The license currently authorizes possession of up to 250 mCi H-3, 50 mCi C-14, 100 mCi P-32, and 50 mCi S-35 in any chemical form, with H-3 required to be bound. Over the course of the license there have been six amendments as presented in the table below.

Table 2-2: License 21-32115-002 Amendment History

Amendment Number	Date	Description
0	April 23, 2009	New License
1 (corrected original)	October 14, 2009	Corrected spelling of RSO Name
2	November 16, 2010	Amendment to vivarium rooms 006-1520 and 006-1522 Added an authorized user
3	October 20, 2011	Amendment to vivarium rooms 006-1520 and 006-1522 Added an authorized user Authorized up to 50 mCi of S-35
4	October 23, 2012	Updated Condition 16 Added Condition 17 for sealed source leak tests
5	December 6, 2013	Release of rooms 006-1520 and 006-1522
6	June 16, 2014	Partial release of laboratory facility Suite B

2.3 Operational Radiological Surveys

Routine surveys were performed by authorized users during the period of usage. These surveys focused on specific areas of usage within each room as well as surrounding areas to ensure that residual contamination did not exist above their local action level for removable surface contamination (200 dpm/100 cm^2). No areas of elevated activity were identified during routine operational surveys throughout the life of the license.

2.4 Previous Decommissioning Activities

Several areas of usage have been released by Esperion for unrestricted use. Esperion submitted the survey information and the NRC approved the releases as Amendments 5 and 6 to the license. Because the NRC has already released these areas and they have not been impacted by subsequent operations, the areas are considered non-impacted for this decommissioning effort.

3.0 CURRENT/FUTURE USE

The facility is in its post-survey state in preparation for confirmatory surveys. After achieving license termination, Esperion will vacate the facility and return control to the landlord.

4.0 FACILITY RELEASE CRITERIA

The unrestricted use radiological release criteria are specified in NRC 10CFR20 Subpart E. Specifically, impacted areas of the facility were surveyed in accordance with the guidance contained in MARSSIM to demonstrate compliance with the criteria of 10CFR20.1402, "Radiological Criteria for Unrestricted Use." The criteria are that residual radioactivity results in a TEDE to an average member of the critical group that does not exceed 25 mrem

per year, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).

5.0 NUCLIDES OF CONCERN

After considering quantities used, half-lives, and dates of usage of licensed materials, only C-14 and H-3 are of concern for decommissioning.

Table 5-1: Nuclides of Concern for Decommissioning

Nuclide	Half-life (years)	Predominant Emissions
C-14	5.7E+03	Low Energy Beta
H-3	1.2E+01	Low Energy Beta

6.0 DERIVED CONCENTRATION GUIDELINE LEVELS

The NRC has published DSVs in NUREG 1757, Volume 1, Appendix B for commonly used radionuclides. Screening values for the nuclides of concern are provided in the table below.

Table 6-1: Default Screening Values for Nuclides of Concern

Nuclide	Half-life (years)	Predominant Emissions	DandD Result (mrem/yr per dpm/100 cm^2)	Default Screening Value[1] (dpm/100 cm^2)
C-14	5.7E+03	Low Energy Beta	6.80E-06	3.7E+06
H-3	1.2E+01	Low Energy Beta	2.02E-07	1.2E+08

The DSV's are the basis for developing the derived concentration guideline levels (DCGL's). The DCGL is the radionuclide specific surface activity concentration that could result in a dose equal to the release criterion. $DCGL_W$ is the concentration limit if the residual activity is essentially evenly distributed over a large area. For this project, $DCGL_W$ is equal to the DSV. In the case of non-uniform contamination, MARSSIM allows for evaluation of higher levels of permissible activity over small areas using the $DCGL_{EMC}$. Due to the radiological cleanliness of the facility, $DCGL_{EMC}$ is not used. Additionally, due to the conservative ALARA goal, application of the unity rule for multiple radionuclides is not required to demonstrate compliance with the release criteria.

An important assumption of the dose model is that removable contamination is <10% of total contamination. Historical survey results as well as characterization, final status and quality assurance (QA) survey results confirm that removable contamination levels are very low and meet this assumption. H-3 cannot be accurately detected directly by field instrumentation due to its low energy. Therefore, H-3 contamination was evaluated by removable contamination measurements only.

[1] The default screening value is calculated by dividing the release criterion of 25 mrem/yr by the DandD result in mrem/yr per dpm/100 cm^2.

7.0 ALARA GOALS (INVESTIGATION LEVELS)

Esperion established conservative ALARA goals based on the release criteria for equipment and materials specified in NUREG 1556, Volume 7, Table Q.2, "Acceptable Surface Contamination Levels for Equipment."[2] Specifically, the following surface contamination limits were used:

- 5,000 dpm/100 cm^2 total surface contamination
- 500 dpm/100 cm^2 removable surface contamination

Because of the conservatism of the ALARA goals, these criteria were applied to gross beta measurements and the unity rule was not applied. The number of measurements required by MARSSIM to demonstrate compliance with the release criteria was calculated using the $DCGL_W$.

8.0 ALARA ANALYSIS

Due to the extremely low doses associated with residual radioactivity at the facility, a quantitative ALARA analysis was not required. Default screening values were used to establish DCGLs. Furthermore, Esperion routinely maintained all laboratory areas of the facility at levels < 200 dpm/100 cm^2 removable activity.

NUREG 1757, Volume 2, Appendix N states in part: "For ALARA during decommissioning, all licensees should use typical good-practice efforts such as floor and wall washing, removal of readily removable radioactivity in buildings or in soil areas, and other good housekeeping practices. In addition, licensees should provide a description in the Final Status Survey Report (FSSR) of how these practices were employed to achieve the final activity levels. In light of the conservatism in the building surface and surface soil generic screening levels developed by NRC, NRC staff presumes, absent information to the contrary, that licensees who remediate building surfaces or soil to the generic screening levels do not need to provide analyses to demonstrate that these screening levels are ALARA. In addition, if residual radioactivity cannot be detected, it may be assumed that it has been reduced to levels that are ALARA. Therefore, the licensee may not need to conduct an explicit analysis to meet the ALARA requirement."

9.0 PROJECT MANAGEMENT AND ORGANIZATION

Decommissioning activities were performed under Chase Commonwealth of Kentucky radioactive materials license number 201-605-90, and in accordance with the DWP. Esperion oversaw decommissioning activities and maintained responsibility for building maintenance, fire, and security functions.

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[2] A removable surface contamination limit of 500 dpm/100 cm^2 is used to be consistent with the removable fraction used in the dose model.

10.0 TRAINING

Esperion provided Chase personnel with site specific Contractor Site Orientation Training. Chase provided all project personnel with radiation worker training required by the radioactive materials license, as well as training for project-specific programs, plans, and procedures required by the DWP.

11.0 RADIATION SAFETY AND HEALTH PROGRAM

Radiological work was performed according to the Chase radioactive materials license Radiation Safety Program.

12.0 ENVIRONMENTAL MONITORING PROGRAM

Due to the limited scope of the project, a project-specific environmental monitoring program was not required.

13.0 RADIOACTIVE WASTE MANAGEMENT

All radioactive wastes generated during remediation, as well as any radioactive waste remaining at the facility from operations, were packaged and sealed to prevent release of radioactivity and placed into storage pending pickup for disposal. A waste pickup is scheduled for June 25, 2015. Package external surfaces were verified free of radioactivity prior to placing into storage and will be verified free of external radioactivity upon pickup to preserve the integrity of final status data. After removal of all radioactive materials, Esperion will submit an NRC Form 314 certifying that all radioactive materials have been removed from the site.

14.0 QUALITY ASSURANCE PROGRAM

Project-specific QA requirements were included in the DWP to meet the guidelines of MARSSIM Section 9.

15.0 SURVEY INSTRUMENTATION

15.1 Instrument Calibration

Laboratory and portable field instruments were calibrated within the previous year with National Institute of Standards and Technology (NIST) traceable sources to radiation emission types and energies to provide detection capabilities similar to the nuclides of concern. Portable instrument calibration records are included as Appendix C.

15.2 Functional Checks

Functional checks were performed at least daily when in use. The background, source check, and field measurement count times for radiation detection instrumentation were specified by procedure to ensure measurements were statistically valid. Background

readings were taken as part of the daily instrument check and compared with the acceptance range for instrument and site conditions.

Daily functional checks of the liquid scintillation counter consisted of performing the instrument's automatic quality assurance protocol that utilizes H-3 and C-14 sources as well as a background standard.

15.3 Minimum Detectable Concentrations

Minimum counting times for background determinations and measurement of total and removable contamination were chosen to provide a minimum detectable concentration (MDC) that met the data quality objectives (DQOs). MARSSIM equations relative to building surfaces have been modified to convert to units of dpm/100 cm^2. Count times and scanning rates are determined using the following equations:

15.3.1 Static Counting

Static counting Minimum Detectable Concentration at a 95% confidence level is calculated using the following equation, which is an expansion of NUREG 1507, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions", Table 3.1 (Strom & Stansbury, 1992):

$$MDC_{static} = \frac{3 + 3.29\sqrt{B_r \cdot t_s \cdot (1 + \frac{t_s}{t_b})}}{t_s \cdot E_{tot} \cdot \frac{A}{100cm^2}}$$

Where:

MDC_{static} = minimum detectable concentration (dpm/100 cm^2)
B_r = background count rate (counts per minute)
t_b = background count time (minutes)
t_s = sample count time (minutes)
E_{tot} = total detector efficiency for radionuclide emission of interest (cpm/dpm)
A = detector probe area (cm^2)

A typical static MDC calculation for C-14 using the Ludlum Model 43-37 gas flow proportional detector is shown below:

$$MDC_{STATIC} = \frac{3 + 3.29\sqrt{(1500)(.1)\left(1 + \frac{0.1}{0.1}\right)}}{(0.1)(0.075)\frac{582}{100}} = 1{,}374 \text{ dpm/100cm}^2$$

15.3.2 Ratemeter Scanning

Scanning Minimum Detectable Concentration at a 95% confidence level is calculated using the following equation, which is a combination of MARSSIM equations 6-8, 6-9, and 6-10:

$$MDC_{scan} = \frac{d'\sqrt{b_i}\left(\frac{60}{i}\right)}{\sqrt{p}\cdot E_{tot}\cdot\frac{A}{100cm^2}}$$

Where:

MDC_{scan} = minimum detectable concentration (dpm/100 cm^2)
d' = desired performance variable (1.38)
b_i = background counts during the residence interval (counts)
i = residence interval (seconds)
p = surveyor efficiency (0.5)
E_{tot} = total detector efficiency for radionuclide emission of interest (cpm/dpm)
A = detector probe area (cm^2)

A typical MDC_{SCAN} calculation for C-14 using the Ludlum 43-37 gas flow proportional detector is shown below:

$$i = 13.3\,\text{cm}\cdot\frac{\text{inch}}{2.54\,\text{cm}}\cdot\frac{\text{sec}}{20\,\text{inch}}\cdot = 0.262\,\text{sec}$$

$$b_i = 0.262\,\text{sec}\cdot\frac{1500\,\text{counts}}{\text{minute}}\cdot\frac{\text{minute}}{60\,\text{sec}} = 6.55\,\text{counts}$$

$$MDC_{SCAN} = \frac{1.38\sqrt{6.55}\left(\frac{60}{0.262}\right)}{\left(\sqrt{0.5}\right)(0.075)\left(\frac{582}{100}\right)} = 2{,}621\,\text{dpm/100cm}^2$$

15.3.3 Smear Counting

Smear counting Minimum Detectable Concentration at a 95% confidence level is calculated using the following equation, which is NUREG 1507, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions", Table 3.1 (Strom & Stansbury, 1992):

$$MDC_{smear} = \frac{3 + 3.29\sqrt{B_r \cdot t_s \cdot (1 + \frac{t_s}{t_b})}}{t_s \cdot E}$$

Where:

MDC_{smear} = minimum detectable concentration level (dpm/smear)
B_r = background count rate (counts per minute)
t_b = background count time (minutes)
t_s = sample count time (minutes)
E = instrument efficiency for radionuclide emission of interest (cpm/dpm)

The liquid scintillation counter was setup to count samples in three channels as described in Section 20.4. The MDC calculation for each LSC channel using conservative parameters is shown below. Even though channel 3 results were used qualitatively, the MDCR was calculated for evaluation of survey results to use the same MDC equation for all three LSC channels, the efficiency for Channel 3 is set to 1 to report MDCR in cpm.

$$^{3}\text{H MDC}_{\text{SMEAR}} = \frac{3 + 3.29\sqrt{(25)(1)\left(1 + \frac{1}{1}\right)}}{(1)(0.60)} = 44 \text{ dpm}$$

$$^{14}\text{C MDC}_{\text{SMEAR}} = \frac{3 + 3.29\sqrt{(15)(1)\left(1 + \frac{1}{1}\right)}}{(1)(0.80)} = 26 \text{ dpm}$$

$$\text{Channel 3 MDC}_{\text{SMEAR}} = \frac{3 + 3.29\sqrt{(50)(1)\left(1 + \frac{1}{1}\right)}}{(1)(1)} = 36 \text{ cpm}$$

Because the counting efficiency is different for each LSC measurement depending on quench characteristics, and in consideration of the errors associated with wipe counting (i.e., area wiped, wiping pressure, etc.), the *a priori* estimates of smear MDCs calculated above are applied to all removable contamination measurements.

15.4 Uncertainty

The uncertainty for each static measurement is calculated using equation 6-15 from MARSSIM:

$$\sigma = 1.96\sqrt{\frac{C_{s+b}}{T_{s+b}^{\ 2}} + \frac{C_b}{T_b^{\ 2}}}$$

where:

σ	=	uncertainty
1.96	=	multiplier to achieve a 95% confidence level
C_{s+b}	=	gross sample counts
T_{s+b}	=	sample count time (min.)
C_b	=	gross background counts
T_b	=	background count time (min.)

Uncertainties presented with total surface activity results are additionally corrected for detection efficiency and probe area for presentation in the same units as total surface activity results.

15.5 Instrumentation Specifications

The instrumentation used for facility decommissioning surveys is summarized in the following tables.

Table 15-1: Instrumentation Specifications

Detector Model	Detector Type	Detector Area	Meter Model	Window Thickness	Typical Efficiency [3]
Ludlum 43-68	Gas Flow Proportional	126 cm^2	Ludlum 2241-3	0.8 mg/cm^2	7.5 % (C-14)
Ludlum 43-37 Floor Monitor	Gas Flow Proportional	582 cm^2	Ludlum 2241-3	0.8 mg/cm^2	7.5 % (C-14)
Packard TriCarb	Liquid Scintillation	N/A	N/A	N/A	60% (H-3) 80% (C-14)

[3] The efficiency for each smear sample is automatically determined by the liquid scintillation counter for the H-3 and C-14 channels, depending on the quench characteristics of the sample. The values presented are typical values for samples that are not highly quenched as would be expected in a facility that was recently decontaminated. Channel 3 was used qualitatively and therefore not listed in the table.

Table 15-2: Typical Instrument Operating Parameters and Sensitivities

Measurement Type	Detector Model	Max. Scan Rate[4]	Count Time	Background (cpm)	MDC (dpm/100 cm^2)
Surface Scans	Ludlum 43-68	6 in./sec.	N/A	500	4,707 (C-14)
Surface Scans	Ludlum 43-37	20 in./sec.	N/A	1,500	2,621 (C-14)
Total Surface Activity	Ludlum 43-68	N/A	6 sec.	500	3,799 (C-14)
Total Surface Activity	Ludlum 43-37	N/A	6 sec.	1,500	1,374 (C-14)
Removable Activity	Packard TriCarb	N/A	60 sec.	25 (H-3) 15 (C-14)	44 (H-3) 26 (C-14)

15.6 Efficiency Determination

ISO 7503-1 methods were used for the limiting nuclide (C-14) to determine field concentrations for final status data and calculation of resultant doses from residual radioactivity. MARSSIM protocols for building structures use ISO-7503-1 methodology that takes into account the texture of the surface and the 2π detector efficiency. Under MARSSIM, the default surface efficiency for beta emitters with maximum energies less than 400 keV is conservatively set at 0.25.

15.7 Datalogging

Structural surface scans and static measurements were performed using datalogging instrumentation. While scanning, in addition to the surveyor listening to the audible output, integrated counts were recorded. Logged data were downloaded and processed using data management software to perform data analyses and reporting. Reporting includes graphical (4-plot) presentation of scan data as well as summary statistics functions. The 4-Plot is described in the NIST e-Handbook of Statistical Methods (http://www.itl.nist.gov/div898/handbook/index.htm).

A 4-plot consists of the following:

- A run **sequence plot** presents logged data in chronological order, providing a time history of the survey data.
- A **lag plot** checks whether a data set or time series is random or not. Random data should not exhibit any identifiable structure in the lag plot. Non-random structure in the lag plot indicates that the underlying data are not random.
- A **histogram plot** graphically summarizes the distribution of a univariate data set, showing center (i.e., the location) of the data, spread (i.e., the scale) of the data, skewness of the data, presence of outliers, and presence of multiple modes.

[4] Maximum scan rates are calculated based on the instrument MDCs. Actual scan rates were much slower.

- A **probability plot** is a goodness-of-fit test used to verify the distributional model. The normal probability plot is a graphical technique for assessing whether or not a data set is approximately normally distributed. The data are plotted against a theoretical normal distribution in such a way that the points should form an approximate straight line. Departures from this straight line indicate departures from normality

16.0 DATA QUALITY OBJECTIVES (DQO)

The following is a list of the major DQOs for the survey design from the DWP:

- Static measurements will be taken to achieve an MDC_{static} of less than 50% of the applicable DCGL.
- Scanning will be conducted at a rate to achieve an MDC_{scan} of less than 50% of the applicable DCGL.
- Removable contamination measurements will be counted to an MDC_{smear} of less than 50% of the applicable removable DCGL.
- Individual measurements will be made to a 95% confidence interval.
- Decision error probability rates will be set at 0.05 for both α and β.
- The null hypothesis (H_0) and alternative hypothesis (H_A) are that of NUREG 1505 scenario A:
  - H_0 is that the survey unit does not meet the release criteria
  - H_A is that the survey unit meets the release criteria
- Characterization and remedial action support surveys will be conducted under the same quality assurance criteria as final status surveys such that the data may be used as final status survey data to the maximum extent possible.

17.0 AREA CLASSIFICATIONS

Based on the results of the historical site assessment and previous survey results, facility areas were classified as impacted or non-impacted.

17.1 Non-Impacted Area

Non-impacted areas were areas without residual radioactivity from licensed activities and were not surveyed during final status surveys. The following areas were classified as non-impacted:

- Structural surfaces above a two meter height
- Internal surfaces of positively pressurized systems (air, gas, water, etc.)
- Surface and subsurface soils of outside grounds

Based on historical operations, a potential existed for residual contamination from spills or tracking on surfaces less than two meters in height. Thorough surveys of impacted area entrances/exits and ventilation exhausts were conducted during characterization to provide adequate assurance that any residual contamination was contained within

impacted areas. These surveys were performed to verify the non-impacted classification of surrounding areas.

17.2 Impacted Areas

Impacted areas were those areas that had potential residual radioactivity from licensed activities. Impacted areas are subdivided into Class 1, Class 2 or Class 3 areas. Class 1 areas have the greatest potential for contamination and therefore receive the highest degree of survey effort for the final status survey using a graded approach, followed by Class 2, and then by Class 3. Impacted sub-classifications are defined as follows:

17.2.1 Class 1 Area

Areas with the highest potential for contamination, and meet the following criteria: (1) impacted; (2) potential for delivering a dose above the release criterion; (3) potential for small areas of elevated activity; and (4) insufficient evidence to support classification as Class 2 or Class 3.

There are no Class 1 areas.

17.2.2 Class 2 Area

Areas that meet the following criteria: (1) impacted; (2) low potential for delivering a dose above the release criterion; and (3) little or no potential for small areas of elevated activity.

Areas with a history of radioactive materials usage were classified as Class 2.

17.2.3 Class 3 Area

Areas that meet the following criteria: (1) impacted; (2) little or no potential for delivering a dose above the release criterion; and (3) little or no potential for small areas of elevated activity.

There are no Class 3 areas.

17.3 Survey Units

A survey unit is a geographical area of specified size and shape for which a separate decision is made whether or not that area meets the release criteria. A survey unit is normally a portion of a building or site that is surveyed, evaluated, and released as a single unit. For the purposes of this project, areas of similar construction and composition were grouped together as survey units and tested individually against the DCGLs and the null hypothesis to show compliance with the release criteria. Survey units were homogeneous in construction, contamination potential, and contamination distribution.

The number of discrete sampling locations needed to determine if a uniform level of residual radioactivity exists within a survey unit does not depend on the survey unit size. However, the sampling density should reflect the potential for small elevated areas of residual radioactivity. Survey units were sized according to the potential for small

elevated areas of residual radioactivity. Recommended maximum survey unit sizes for building structures, based on floor area, is Class 1: up to 100 m^2, Class 2: 100 m^2 to 1000 m^2 and Class 3: no limit.

Survey Unit Numbering Protocol

Each survey unit is assigned a unique number consisting of the building number followed by a dash and a four digit identifier. The four digit identifier consists of one digit for the elevation, one digit for the classification, and two digits as a numerical identifier in the event the first 2 digits are the same for two or more survey units using the format below:

Building Number – Elevation/Classification/Numerical Identifier

The default numeric identifier is 01

Buildings:
ESP = 46701 Commerce Center Drive

Elevations:
1 = 1st Floor

Building systems survey units were arranged by building and system type. There are three types of systems – ventilation, vacuum, and drain. Each system survey unit encompasses all of a certain type within the building.

Systems Components:
DR – Drain
VA – Vacuum
VE – Ventilation

Examples:
ESP-1201 is Esperion leased area, first floor, Class 2
ESP-DR01 is Esperion leased area drains

Survey unit classifications and designations were determined from the historical site assessment and are listed in the tables below. Survey unit designations are presented graphically on the building floor plans presented in Appendix B.

Table 17-1: Building Structural Survey Units

Survey Unit	Description
ESP-1201	Lab B-1

Table 17-2: Building Systems Survey Units

Survey Unit	Description
ESP-DR01	Drain System
ESP-VE01	Ventilation System
ESP-VA01	Vacuum System

18.0 CHARACTERIZATION SURVEYS

The survey protocol for building surfaces consisted of performing the scanning portion of the final status survey protocol, with judgmental smears and static measurements on areas of highest probability for residual radioactivity. Judgmental static measurements and smears were taken on vertical surfaces as part of the Class 2 final status survey protocols described in section 20.3.5.

The purpose of scanning was to identify locations of elevated activity. The minimum scan percentages are presented in section 20.2. Scanning was performed by moving the probe over surfaces at a distance of approximately 0.5 cm or less and at a rate less than the maximum allowable scan rate necessary to achieve DQOs.

The survey protocol for building system surveys consisted of performing removable contamination measurements of accessible internal surfaces of ventilation, vacuum, and drain systems. Fume hood baffles were removed, and static measurements performed in addition to the removable contamination measurements. Static measurements were not possible in vacuum and drain systems due to geometry.

Characterization scan surveys of building structural surfaces identified one small discrete area of elevated activity on a fume hood benchtop. Building systems surveys identified one location above the investigation levels inside a vacuum nozzle. The characterization survey results for these locations of elevated activity and the post-remediation results are presented in section 19.0.

19.0 REMEDIATION

Remediation consisted of simple decontamination (i.e. wet wiping with a mild detergent) and removal of contaminated material. All remediation activities were conducted to control the spread of contamination and to maintain personnel exposures ALARA.

All post remediation total and removable surface activity results are below the applicable DCGL. The highest post-remediation total activity result on building structural surfaces is 5,850 dpm/100 cm^2. Because the result is an extremely small fraction (less than 0.16%) of the C-14 DCGL of 3.7E+6 dpm/100 cm^2, and removable radioactivity is less than the investigation level, no further remediation was performed. The highest post-remediation total activity result on building systems is 241 dpm/100 cm^2 removable H-3 activity, and 9,614 dpm/100 cm^2 removable C-14 activity. Because the result is an extremely small fraction (less than 0.26%) of the C-14 removable DCGL of 3.7E+5 dpm/100 cm^2, no further remediation was performed.

Remediation performed on building surfaces and systems is summarized in the table below.

Table 19-1: Remediated Building Surfaces

Survey Unit (Room #)	Location (Area ft^2)	Maximum Activity		Remediation Method	Post-Remediation Maximum Activity	
		Total (dpm/100 cm^2)	Removable (dpm/100 cm^2)		Total (dpm/100 cm^2)	Removable (dpm/100 cm^2)
ESP-1201 (1402)	Fume Hood Benchtop (<1)	13,884	34 – ^{3}H 73 – ^{14}C	Wet Wipe/ Scrub	5,850	10 – ^{3}H 20 – ^{14}C

Table 19-2: Remediated Building Systems

Survey Unit (Room #)	Location (Area ft^2)	Maximum Activity		Remediation Method	Post-Remediation Maximum Activity [5]	
		Total (dpm/100 cm^2)	Removable (dpm/100 cm^2)		Total (dpm/100 cm^2)	Removable (dpm/100 cm^2)
ESP-VA01 (1402)	Vacuum Piping	N/A	241 – ^{3}H 8,279 – ^{14}C	Removed Nozzle	N/A	241 – ^{3}H 9,614 – ^{14}C

19.1 Remedial Action Surveys

Remedial action surveys were conducted in support of remediation activities to help determine when an area was ready for a final status survey and to provide updated estimates for final status survey planning. Remedial action surveys served to monitor the effectiveness of decontamination efforts and to ensure that surrounding areas were not cross-contaminated from remediation.

Remedial action surveys consisted of scan surveys and removable contamination measurements. These were conducted following remediation activities to establish the success or failure of decontamination efforts. Results of the survey were the decision basis for continued remediation or conduct of final status surveys. Remedial action surveys were designed to meet the objectives of the final status surveys and, to the extent allowed by MARSSIM, the results of the remedial action surveys were used to supplement the final status survey.

[5] The post-remediation result is inside the remaining vacuum pipe. Because the results are similar to the results inside the nozzle that was removed and all results are an extremely small fraction of the DCGLs, the hood was not disassembled in order to remove more piping. This would have required replacement of the piping in order to maintain the system in an operational state.

20.0 FINAL STATUS SURVEYS

Final status surveys were performed using the DQO process to demonstrate that residual radioactivity in each survey unit satisfied the predetermined criteria for release for unrestricted use. Final status surveys were conducted by performing the appropriate combination of scan surveys, total activity measurements and removable activity measurements as discussed further in this section. All final status surveys were performed according to written instructions. Survey data were documented on survey maps and/or associated data information sheets.

20.1 Background Determination

The use of reference background areas or paired background comparisons was not necessary. Material and ambient background values were not significant in comparison to the DCGLs or ALARA goals. For direct measurements, an ambient background was determined for each survey, was subtracted from gross measurements, and was used to calculate the actual survey MDCs and associated count errors. Material-specific background determinations were not performed. Background was not subtracted from removable activity measurements and results are reported in gross dpm/100 cm^2 for channels H-3 and C-14, and gross cpm/100 cm^2 for channel C.

20.2 Surface Scans

Scanning was used to identify locations within the survey unit that exceed the investigation level. The table below summarizes the minimum scan percentage of accessible building structural surfaces based on classification.

Table 20-1: Scan Survey Coverage by Classification

Structure	Class 2
Floors	75%
Fume Hoods	100%
Other Structures	50%

For surfaces that received less than 100% scan survey, the surfaces scanned were those with the highest potential to contain residual radioactivity at the discretion of the surveyor.

20.3 Total Surface Activity Measurements

Direct surveys (static measurements) for total surface activity were taken on building surfaces in impacted areas utilizing instrumentation of the best geometry based on the surface at the survey location. Additionally, locations of elevated activity identified and marked during the scan survey received direct survey measurements. Static measurements were taken in impacted areas at each identified sample location. Scaler count times were determined to achieve the detection sensitivities stated in the DQOs. Field measurements were converted to activity concentrations using the following equation:

$$Activity\ (dpm/100\ cm^2) = \frac{R_{s+b} - R_b}{E_{total} \times \frac{A}{100\ cm^2}}$$

Where:

R_{s+b}	=	The gross count rate of the measurement in cpm
R_b	=	The background count rate in cpm
E_{total}	=	Total Efficiency
A	=	Area of the detector window (cm^2)

20.3.1 Determining the Number of Samples

The minimum number of samples required for the Sign Test was calculated using equations in Section 5 of MARSSIM. A conservative estimate of the standard deviation of total surface activity measurements (1,000 dpm/100 cm^2) was used. The LBGR was set at one half of the DCGL. The calculations performed to determine the required numbers of samples are provided below.

20.3.2 Determination of the Relative Shift

The number of required samples depends on the ratio involving the activity level to be measured relative to the variability in the concentration. The ratio to be used is called the Relative Shift, Δ/σ_S, and is defined in MARSSIM as:

$$\Delta / \sigma_S = \frac{DCGL - LBGR}{\sigma_S}$$

Where:

DCGL	=	derived concentration guideline level (dpm/100 cm^2)
LBGR	=	concentration at the lower bound of the gray region. The LBGR is the average concentration to which the survey unit should be cleaned in order to have an acceptable probability of passing the test (dpm/100 cm^2)
σ_S	=	an estimate of the standard deviation of the residual radioactivity in the survey unit (dpm/100 cm^2)

The actual calculation is provided below:

$$\Delta / \sigma_S = \frac{3.7E6 - 1.85E6}{1{,}000} = 1{,}850$$

Since MARRSIM Table 5.5 does not include relative shifts above 3 and the number of samples required decreases with an increasing relative shift, the relative shift was conservatively set at 3.

20.3.3 Determination of Acceptable Decision Errors

A decision error is the probability of making an error in the decision on a survey unit by passing a unit that should fail (α decision error) or failing a unit that should pass (β decision error). The decision errors are 0.05 for both α and β.

20.3.4 Determination of Number of Data Points (Sign Test)

The number of direct measurements for a particular survey unit, employing the Sign Test, is determined from MARSSIM Table 5.5, which is based on the following equation (MARSSIM equation 5-2):

$$N = \frac{\left(Z_{1-\alpha} + Z_{1-\beta}\right)^2}{4\left(SignP - 0.5\right)^2}$$

Where:

N	= number of samples needed in the survey unit
$Z_{1-\alpha}$	= percentile represented by the decision error α
$Z_{1-\beta}$	= percentile represented by the decision error β
SignP	= estimated probability that a random measurement will be less than the DCGL when the survey unit median is actually at the LBGR

Note: SignP is determined from MARSSIM Table 5.4

MARSSIM recommends increasing the calculated number of measurements by 20% to ensure sufficient power of the statistical tests and to allow for possible data losses. MARSSIM Table 5.5 values include an increase of 20% of the calculated value. The approach for this project was to predetermine a number of samples to be applied to all survey units. This approach provides sufficient power for the statistical test while streamlining the survey planning process. The following calculations were made to determine this number:

$$N = \frac{(1.645 + 1.645)^2}{4(0.998650 - 0.5)^2} = 11$$

$Z_{1-\alpha}$ and $Z_{1-\beta}$ are equal to 1.645 using the error rate of 0.05 from MARSSIM Table 5.2. SignP is equal to 0.998650 from MARSSIM Table 5.4. Adding an additional 20% to account for data losses resulted in a value of 14.

Therefore, the determined number of samples per survey unit for the final status surveys for planning purposes was **14**.

20.3.5 Determination of Sample Locations

Class 2 survey units generally consist of multiple rooms. The process to identify, map and locate measurement coordinates in survey units with many rooms is complicated due to the noncontiguous nature of the survey unit once walls are "folded-out". Therefore, the MARSSIM sample measurement locations (i.e., random static and wipe measurements) were determined only on horizontal

surfaces as determined on floor plans. This protocol increases the sample density on the surfaces with the highest probability for residual contamination (floors, benchtops, fume hood working surfaces, etc.). The appropriate percentage of all survey unit surfaces (including vertical surfaces) was scanned according to the survey unit classification. In laboratory areas, permanent counter tops and other horizontal surfaces that block floor surfaces were included as a replacement to the blocked floor surface. Internal surfaces of permanent furnishings (i.e., drawer or cabinetry interior surfaces) were not included in the systematic measurement location placement. However, these surfaces were included in the scan surveys. Additional total surface activity measurements were collected at each area of elevated activity identified during the scan surveys.

As part of characterization, the survey technician judgmentally selected locations with the highest probability of contamination on vertical surfaces for a static measurement and smear, such as light switches, door knobs, door pulls, push plates, and other locations. These measurements were in addition to and were not included in the statistical analysis of the locations selected by MARSSIM protocols.

Determination of Class 2 survey unit sample locations was accomplished by first determining sample spacing and then systematically plotting the sample locations from a randomly generated start location. Sample spacing was determined from MARSSIM equation 5-8:

$$L = \sqrt{\frac{A}{N}} \text{ for a square grid}$$

Where:

L = sample spacing interval
A = the survey unit floor area
N = number of samples needed in the survey unit

A random starting point was determined using computer-generated random numbers coinciding with the x and y coordinates of the total survey unit. A grid was plotted across the survey unit surfaces based on the random start point and the determined sample spacing. A measurement location was plotted at each intersection of the grid. Maps of final status survey locations for all survey units are included in Appendix D.

20.4 Removable Contamination Measurements

Removable contamination measurements were collected by wiping an area of approximately 100 cm^2 on structural surfaces, ventilation systems, and drain systems. Removable contamination measurements on vacuum systems are reported dpm/swab. The smears/swabs were counted to achieve the detection sensitivities stated in the DQOs.

The LSC was set up for three channels without background subtraction at the following energies:

Channel 1 (^{3}H dpm):	0 – 12 keV
Channel 2 (^{14}C dpm):	12 – 156 keV
Channel 3 (cpm):	0 – 2,000 keV

Channel 3 results were used to verify that H-3 and C-14 are the only nuclides of concern.

20.5 Surveys of Building Mechanical System Internals

Surveys of various building system components were performed. Survey design for these systems is out of the scope of MARSSIM. For the purposes of identifying potential residual contamination within these systems, a survey protocol was established and is presented in the table below.

Table 20-2: System Survey Coverage

System Component	Coverage
Vacuum Nozzles, Pumps, Accumulators	100%
Fume Hood Vent Ducts and Fans	100%
Drain Openings/Traps	100%

20.6 Survey Documentation

A survey package was developed for each survey unit containing the following:

- Survey Unit number (e.g., Building and Room Number, System Number, etc.)
- Survey Instruction Sheets
- General survey requirements
- Percentage of surfaces requiring scan surveys
- Number of total and removable contamination measurements required, instrument requirements with associated MDCs, count times and scan rates
- Overview maps detailing survey locations and placement methodology
- Survey Data Sheets
- Any additional specific survey instruction
- Signature of Data Collector and Reviewer

To ensure proper data management and organization, a unique location code system was used so that survey data could be properly entered and organized in the Final Status Survey Database. A breakdown of the location code and specific code components are provided in the table below.

Table 20-3: Location Code Description

A unique location code was assigned to each individual survey location to ensure proper data management of the survey results. The following format was used to ensure consistency throughout the final status survey process:

BBB-RRRR-SS-M-LLL

Where:

BBB: = Building Code. This field represents the building number. (3 characters)
ESP: 46701 Commerce Center Drive

RRRR: = Survey Unit Number. This is the assigned survey unit number. (4 characters)

SS: = Structural Surface Code. This field represents the structural surface such as floor, wall, ceiling, etc. (2 characters)

B1 = Benchtop	D1 = Fumehood Drains	E1 = Hood Exhaust Duct
F1 = Floor	D2 = Floor Drains	E2 = General Ventilation
	D3 = Sink Drains	E3 = Hood Exhaust Fan / Component
		V1 = Vacuum Nozzle
		V2 = Vacuum Component

M: = Structural Material Code. This field represents the type of structural material on which a particular measurement is taken. (1 character)

M = Miscellaneous
V = Vinyl Tile/Sheeting

LLL: = Numerical Identifier. This field represents the survey location number. The field "001" means survey point location number 1. Numerical identifiers are unique within a survey unit. (3-characters)

21.0 SURVEY RESULTS AND DATA QUALITY ASSESSMENT

The statistical guidance contained in Section 8 of MARSSIM was used to determine if areas are acceptable for unrestricted release and whether additional surveys or sample measurements were required.

21.1 Data Validation

Field data were reviewed by the Project Manager and validated to ensure:

- Completeness of forms
- Proper types of surveys were performed
- The MDCs for measurements met the established data quality objectives
- Independent calculations were performed on a representative sample of data sheets
- Satisfactory instrument calibrations and daily functionality checks were performed as required

Additionally, all final status survey data were entered into the Final Status Survey Database. This provided the means to sort survey data, verify activity calculations, and to compute the associated MDC and counting errors. Once data entry for a survey unit was complete, a verification report was printed and compared to original data sheets to ensure correct data entry.

21.2 Preliminary Data Review

A preliminary data review was performed for each survey unit to identify any patterns, relationships or anomalies. Additionally, measurement data were reviewed and compared with the DCGLs and investigation levels to confirm the correct classification of survey units.

The following preliminary data reviews were performed for each survey unit:

- Review of the 4-Plot graphs of scan data
- Calculations of the survey unit mean, median, maximum, minimum, and standard deviation for each type of reading
- Comparison of the actual standard deviation to the assumed standard deviation used for calculating the number of measurements
- Comparison of survey data with applicable investigation levels

The actual standard deviation for all survey units were less than the assumed standard deviation used for calculating the number of measurements, therefore an adequate number of samples were collected for each survey unit.

21.3 Building Structural Surfaces Scan Data

No elevated activity was identified by listening to the audible detector response except for one discrete area of elevated activity as described in Section 18.0. Additionally, a 4-Plot was produced of scan survey data for the survey unit. The 4-Plot graph indicates that

the data is normally distributed. 4-Plot graphs of scan results are provided in Appendix E.

21.4 Data Summary Tables

All calculations of means, standard deviations, minimum and maximum values and comparisons between survey data and investigation levels are presented in the following tables. Building structural surface activity reports for each survey unit are included as Appendix F. Reports for building systems surveys are presented in Appendix G.

Table 21-1: Structural Surfaces Total Beta Surface Activity Summary

Survey Unit	# of Sample Locations	Mean	MDC	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(dpm/100 cm^2)						
ESP-1201	18	219	3,351	741	-1,098	1,537	5,000	NO

Table 21-2: Building Structural Surfaces Removable H-3 Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross dpm/100 cm^2)					
ESP-1201	18	17	10	0	37	500	NO

Table 21-3: Building Structural Surfaces Removable C-14 Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross dpm/100 cm^2)					
ESP-1201	18	12	5	2	19	500	NO

Table 21-4: Building Structural Surfaces Removable Channel 3 Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross cpm/100 cm^2)					
ESP-1201	18	28	7	13	42	500	NO

Table 21-5: Building Systems Total Beta Surface Activity Summary

Survey Unit	# of Sample Locations	Mean	MDC	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(dpm/100 cm^2)						
ESP-VE01	2	-488	2,691	1,102	-1,267	292	5,000	NO

Table 21-6: Building Systems Removable H-3 Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross dpm/100 cm^2) [6]					
ESP-DR01	11	15	14	0	44	500	NO
ESP-VA01	13	30	65	0	241	500	NO
ESP-VE01	17	9	8	0	23	500	NO

Table 21-7: Building Systems Removable C-14 Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross dpm/100 cm^2) [6]					
ESP-DR01	11	25	29	5	112	500	NO
ESP-VA01	13	758	2,661	11	9,614	500	YES
ESP-VE01	17	13	5	6	26	500	NO

[6] Vacuum nozzle removable activity results are reported in dpm/swab.

Table 21-8: Building Systems Removable Channel 3 Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross cpm/100 cm^2) [6]					
ESP-DR01	11	36	31	8	125	500	NO
ESP-VA01	13	730	2,532	4	9,157	500	**YES**
ESP-VE01	17	24	6	12	38	500	NO

21.5 Determining Compliance for Building Surfaces and Structures

Final status survey results were initially compared to the investigation levels. One small discrete area of elevated activity above the investigation levels was identified on a fume hood benchtop during characterization surveys. The area was remediated and resurveyed with results of 5,850 dpm/100 cm^2 total activity, 10 dpm/100 cm^2 removable H-3 activity, and 20 dpm/100 cm^2 removable C-14 activity. No further action was taken because this is an extremely small fraction of the DCGL.

All total and removable surface activity results on building structural surfaces were less than the DCGL and an adequate number of samples were obtained, therefore all survey units pass the Sign test.

The results of the data quality assessment and calculations of the dose from each structural surface survey unit are presented in the table below.

Table 21-9: Structural Surfaces Total Beta Surface Activity Dose Calculations

Survey Unit	Standard Deviation (dpm/100 cm^2)	# Samples Required	Actual # of Samples	Adequate # of Samples?	Mean (dpm/100 cm^2)	Calculated Annual TEDE[7] (mrem/yr)
ESP-1201	741	11	18	YES	219	0.0015

All measurement results are less than the DCGL and an adequate number of measurements were taken; therefore the null hypothesis is rejected and all survey units meet the release criterion and are suitable for release for unrestricted use.

21.6 Determining Compliance for Building Systems

Final status survey results were initially compared to the investigation levels. One vacuum nozzle had a removable C-14 result above the investigation level. The vacuum nozzle was removed and the remaining piping internals had survey results of 241 dpm/100 cm^2 removable H-3 activity, and 9,614 dpm/100 cm^2 removable C-14 activity. No further action was taken because this is less than 0.26% of the C-14 removable DCGL

[7] The TEDE shown is conservatively calculated by multiplying 25 mrem/yr by the ratio of the mean total surface activity to the C-14 DCGL of 3.7E6 dpm/100 cm^2.

of 3.7E5 dpm/100 cm^2 and further remediation would have required repairs to the system in order to maintain operability.

All total and removable surface activity measurement results are less than the applicable DCGL; therefore all systems survey units meet the release criteria and are suitable for release.

22.0 QUALITY ASSURANCE SURVEYS

Quality assurance surveys consisted of re-performing the FSS protocol for building structural surfaces to achieve a minimum of 5% duplication of scans, static measurements and smears. The Project Manager implemented QA surveys by re-performing judgmentally selected survey locations as survey unit QA01. The locations of QA survey total and removable surface activity measurements are presented in the table below.

Table 22-1: QA Survey Locations

QA Survey Location	FSS Location
ESP-QA01-F1-V-001	ESP-1201-F1-V-011
ESP-QA01-F1-V-002	ESP-1201-F1-V-018
ESP-QA01-B1-M003	ESP-1201-B1-M-010
ESP-QA01-F1-V-004	ESP-1201-F1-V-015
ESP-QA01-F1-V-005	ESP-1201-F1-V-012

22.1 QA Survey Results

All QA survey results were similar to FSS data and the conclusions were the same as those based on the initial surveys. QA survey results are presented in Appendix H and are summarized in the tables below.

Table 22-2: QA Survey Building Structural Surfaces Total Activity Summary

Survey Unit	# of Sample Locations	Mean	MDC	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(dpm/100 cm^2)						
ESP-QA01	5	-197	3,263	578	-878	549	5,000	NO

Table 22-3: QA Survey Building Structural Surfaces Removable H-3 Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross dpm/100 cm^2)					
ESP-QA01	5	11	12	0	26	500	NO

Table 22-4: QA Survey Building Structural Surfaces Removable C-14 Summary

Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross dpm/100 cm^2)					
ESP-QA01	5	13	3	8	15	500	NO

Table 22-5: QA Survey Building Structural Surfaces Removable Channel 3 Summary

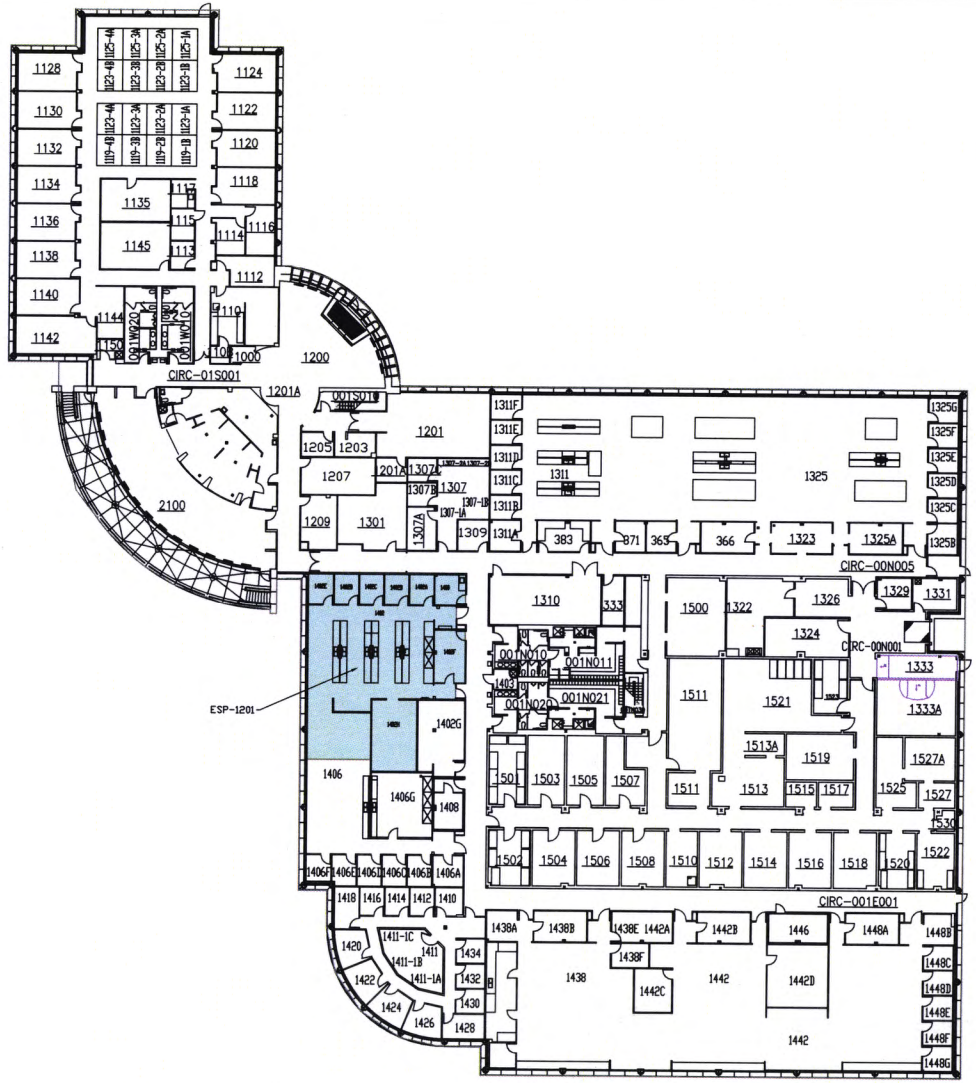
Survey Unit	# of Sample Locations	Mean	Standard Deviation	Min.	Max.	Investigation Level	Any Result Exceeding Investigation Level?
		(gross cpm/100 cm^2)					
ESP-QA01	5	25	7	14	32	500	NO

23.0 REFERENCES

1. Esperion Therapeutics, Inc. NRC radioactive materials license number 21-32115-02
1. Esperion Therapeutics, Inc. Decommissioning Work Plan, May 23, 2015
2. Chase Commonwealth of Kentucky radioactive materials license number 201-605-90
3. NRC Regulations
4. NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM)
5. NUREG-1757, Volume 1, Rev. 2 "Consolidated NMSS Decommissioning Guidance: Decommissioning Process for Materials Licensees," September, 2006
6. NUREG 1507, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions"
7. ISO-7503-1, "Evaluation of Surface Contamination – Part 1: Beta Emitters and Alpha Emitters." 1988
8. NUREG 1556, Volume 7, Table Q.2, "Acceptable Surface Contamination Levels for Equipment," December 1999

Esperion Therapeutics, Inc.
Plymouth Site
Final Status Report

Building: ESP	Site Sattelite Photo	Page: A.1 of A.1



Class 2

Esperion Therapeutics, Inc.
Plymouth Site
Final Status Report

CHASE Environmental Group Inc.

Building: ESP	Elevation: 1st	Page: B.1 of B.1

SEC INSTRUMENTATION SERVICES

10512 Lexington Drive
Suite 200
Knoxville, TN 37932

SEC Corporate
2800 Solway Road
Knoxville, TN 37931

Model 2241-3 CALIBRATION FORM

Serial number : 267161 **Customer Name :** Chase
Previous due date : 1/7/2015 **P.O Number :**
Date : 1/16/2015 **Technician :** Carl Hall
Reason For Calibration : Due For Calibration

INSTRUMENT(S) USED DURING CALIBRATION					
Model Number:	500-2	Serial Number:	132896	Calibration Due date:	6/15/2015
Model Number:		Serial Number:		Calibration Due date:	

Instrument Condition	
As Found	As Left
OK	OK

Threshold	
As Found	As Left
4.0	4.0

Battery Indicator
SAT

SCA/RATE Switch
SAT

	Set Voltage		High Voltage Range	
Detector #	As Found	As Left	As Found	As Left
1	1691	1700	SAT	SAT
2	1795	1800	SAT	SAT
3	1167	1175	SAT	SAT
4	1340	1350	SAT	SAT

Digital Scaler				
Target	As Found	%Error	As Left	%Error
250	251	0.40%	251	0.40%
2,500	2,505	0.20%	2,505	0.20%
25,000	25,049	0.20%	25,049	0.20%
250,000	250,495	0.20%	250,495	0.20%

Reproducability		
x.1 or x1 Scale		
250	250	250
x1 or x10 Scale		
2500	2500	2500
x10 or x100 Scale		
25K	25K	25K
x100 or x1000 Scale		
250K	250K	250K

OK	Is the As Found Data within 20% of the set point?	OK	Audio Response
OK	Are the individual counts within 10% of the average?	OK	Push Buttons
OK	Fast / Slow response switch functions properly?	OK	RESET
OK	Does Instrument meet final Acceptance Criteria?	OK	Audio Switch
OK	Calibration sticker attached?	OK	Light

Married with:						
	1700	DET 1	Model:	43-68	Serial Number:	PR289347
	1800	DET 2	Model:	43-37	Serial Number:	PR148503
	1175	DET 3	Model:	43-68	Serial Number:	PR289347
Comments :	1350	DET 4	Model:	43-37	Serial Number:	PR148503

Instrument calibrated per SEC-IS-423.
5 foot cable used for the 43-68
10 foot cable used for the 43-37

Data Instrument is due for next calibration : 1/16/2016

Performed by : Date: 1/16/15 Reviewed by: Date: 1-16-15
Printed name : Carl Hall

Calibration Certificate for 43-37,Serial # PR148503, Bar Code # ,Property # Chase100

Date: 01/16/15 Date Last Cal. Expires: 01/07/15 Technician: Carl Hall
Location: 999999, Reason For Calibration: Due for Calibration

EQUIPMENT USED DURING CALIBRATION MODEL: 2241-3 SERIAL #: 267161 CAL DUE 01/16/16

NIST TRACEABLE SOURCES USED	SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
Efficiencies from last calibration	5744-06	Sr-90	17244 dpm	12,099 cpm	1/1/2015
Pu-239: 19.82 %	5746-06	Tc-99	31900 dpm	20,000 cpm	1/1/2015
Tc-99: 24.14 %	5747-06	Pu-239	25799 dpm	13,099 cpm	1/1/2015
Th-230: 18.96 %	5748-06	Th-230	31899 dpm	17,700 cpm	1/1/2015
SrY-90: 30.81 %					

AS FOUND DATA

AS FOUND Instrument Condition: SAT

Calibration Setpoints

HV (Alpha): 1350 V HV (Beta): 1800 V Threshold: 4 mV

	Alpha		Beta		AF 4 π Efficiencies
Background:	4	CPM	829	CPM	
Pu-239:	4892	CPM	N/A		18.95%
Tc-99:	N/A		8249	CPM	23.26%
Th-230:	5646	CPM	N/A		17.69%
SrY-90:	N/A		6787	CPM	34.55%

☑ Is the As Found Data within 20% of the efficiency from the last cal.?

AS LEFT DATA

AS LEFT Instrument Condition: SAT

AS LEFT DATA after repair, HV adjust or Plateau

HV (Alpha): 1350 V HV (Beta): 1800 V Threshold: 4 mV

	Alpha		Beta		AL 4 π Efficiencies
Background:	4	CPM	829	CPM	
Pu-239:	4892	CPM	N/A		18.95%
Tc-99:	N/A		8249	CPM	23.26%
Th-230:	5646	CPM	N/A		17.69%
SrY-90:	N/A		6787	CPM	34.55%

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

Reproducibility : Isotope: Sr-90 6829 6792 6741 Average: 6787.3 ☑ Are the individual counts within 10% of the average?

If the As Found data (even after repair) is within 10% of the last calibration, then the technician may N/A Plateau Data and go directly to Comments. Geometry of source = flush to surface, except gas proportional probes = 1/8" from surface unless otherwise specified.

PLATEAU DATA

Alpha Source: Pu-239

HV (Alpha)	Response CPM A ch.	Background CPM A ch.	Net 4π Eff.
N/A			

Beta Source: Tc-99

HV (Beta)	Response CPM B ch.	Background CPM B ch.	Net 4π Eff.
N/A			

2 Pi Efficiencies: Pu-239: 37.32% Tc-99: 37.10% Th-230: 31.88% SrY-90: 49.24%

Comments: Married as a set with: Model: 2241-3 Serial #: 267161 Bar Code #:

Calibrated for use with 10 foot cable. DET 2 ß 1800 V. DET 4 ? 1350V. Calibrated plastic spacers attached to probe.

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 01/16/16

Performed by: Carl Hall Reviewed by: Date: 1-16-15

Printed Name: Carl Hall

SEC INSTRUMENTATION SERVICES
10512 Lexington Drive
Suite 200
Knoxville, TN 37932

C-14 SOURCE CALIBRATION FORM

Probe Model Number : 43-37 **Customer Name :** Chase Environmental
Probe Serial Number : PR148503 **Technician :** Carl Hall
Date of Calibration : 1/16/2015

Instruments used during calibration					
Model Number:	2241-3	Serial Number:	267161	Calibration Due Date:	1/16/2016
Model Number:		Serial Number:		Calibration Due Date:	

NIST Traceable Source(s) used :

	Source S/N	Emission Rate	Activity(s) 2 Pi (cpm)	uCi	4Pi (dpm)	Assay Date
1> C-14	DX 295	432	25,920	0.0305405	67,800	5/3/1994

Data

Instrument condition : Sat
High Voltage: 1800

Background: 829

C-14 Count: 9155

2π Efficiency: **32.12%**
4π Efficiency: **12.28%**

Calibration sticker attached? Yes

Comments : **Married as a set with :** **Model :** 2241-3 **Serial # :** 267161

Date instrument is due for next calibration : 1/16/2016

Performed by : Carl Hall Reviewed by : Date : 1-16-15
Printed Name : Carl Hall

Entered in computer inventory by: Date :

SEC INSTRUMENTATION SERVICES

10512 Lexington Drive
Suite 200
Knoxville, TN 37932

SEC Corporate
2800 Solway Road
Knoxville, TN 37931

Model 2241-3 CALIBRATION FORM

Serial number : 253356 | Customer Name : Chase
Previous due date : 3/7/2015 | P.O Number : 102624
Date : 8/21/2014 | Technician : Carl Hall
Reason For Calibration : Short cycle

INSTRUMENT(S) USED DURING CALIBRATION		
Model Number: 500-2	Serial Number: 132896	Calibration Due date: 12/26/2014
Model Number:	Serial Number:	Calibration Due date:

Instrument Condition	
As Found	As Left
OK	OK

Threshold	
As Found	As Left
3.9	4

Battery Indicator
SAT

SCA/RATE Switch
SAT

	Set Voltage		High Voltage Range	
Detector #	As Found	As Left	As Found	As Left
1	1721	1750	SAT	SAT
2	1842	1875	SAT	SAT
3	1102	1125	SAT	SAT
4	1217	1275	SAT	SAT

Digital Scaler				
Target	As Found	%Error	As Left	%Error
250	251	0.40%	251	0.40%
2,500	2,503	0.12%	2,503	0.12%
25,000	25,034	0.14%	25,034	0.14%
250,000	250,344	0.14%	250,344	0.14%

Reproducability		
x.1 or x1 Scale		
250	250	250
x1 or x10 Scale		
2500	2500	2500
x10 or x100 Scale		
25K	25K	25K
x100 or x1000 Scale		
250K	250K	250K

OK	Is the As Found Data within 20% of the set point?	OK	Audio Response
OK	Are the individual counts within 10% of the average?	OK	Push Buttons
OK	Fast / Slow response switch functions properly?	OK	RESET
OK	Does Instrument meet final Acceptance Criteria?	OK	Audio Switch
OK	Calibration sticker attached?	OK	Light

Married with:						
	1750V	DET 1	Model:	43-68	Serial Number:	PR289219
	1875V	DET 2	Model:	43-37	Serial Number:	PR281040
	1125V	DET 3	Model:	43-68	Serial Number:	PR289219
Comments :	1275V	DET 4	Model:	43-37	Serial Number:	PR281040

Instrument calibrated per SEC-IS-423.
Calibrated 43-68 with 5' cable. Calibrated 43-37 with 10' cable.

Date instrument is due for next calibration : 8/21/2015

Performed by : Date: 8/21/14 Reviewed by: Date: 8-25-14
Printed name : Carl Hall

Calibration Certificate

Calibration Certificate for 43-68, Serial # PR289219, Bar Code #, Property # Chase51

Date: 08/21/14 **Date Last Cal. Expires:** 03/07/15 **Technician:** Carl Hall
Location: 999999, **Reason For Calibration:** Due for Calibration

EQUIPMENT USED DURING CALIBRATION

MODEL: 2241-3 **SERIAL #:** 253356 **CAL DUE** 08/21/15

NIST TRACEABLE SOURCES USED	SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
	5747-06	Pu-239	25800 dpm	13,100 cpm	12/27/201
	5746-06	Tc-99	31900 dpm	20,000 cpm	12/27/201
	5748-06	Th-230	34900 dpm	17,700 cpm	12/27/201
	5744-06	Sr-90	18100 dpm	12,700 cpm	12/27/201

Efficiencies from last calibration

Pu-239:	22.85 %
Tc-99:	27.68 %
Th-230:	21.13 %
SrY-90:	40.14 %

AS FOUND DATA

AS FOUND Instrument Condition: SAT

Calibration Setpoints

HV (Alpha): 1100 V HV (Beta): 1725 V Threshold: 4 mV

	Alpha		Beta		AF Efficiencies
Background:	1	CPM	202	CPM	
Pu-239:	4842	CPM	N/A		19.76%
Tc-99:	N/A		8167	CPM	24.97%
Th-230:	5571	CPM	N/A		15.96%
SrY-90:	N/A		6965	CPM	37.36%

☑ Is the As Found Data within 20% of the efficiency from the last cal.?

AS LEFT Instrument Condition: SAT

AS LEFT DATA after repair, HV adjust or Plateau

HV (Alpha): 1125 V HV (Beta): 1750 V Threshold: 4 mV

	Alpha		Beta		AL Efficiencies
Background:	1	CPM	260	CPM	
Pu-239:	5010	CPM	N/A		19.41%
Tc-99:	N/A		8422	CPM	25.59%
Th-230:	6943	CPM	N/A		17.03%
SrY-90:	N/A		7234	CPM	38.53%

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

Reproducibility : Isotope: Sr-90 7287 7246 7198 **Average:** 7243.7 ☑ Are the individual counts within 10% of the average?

(If the As Found data (even after repair) is within 10% of the last calibration, then the technician may N/A Plateau Data and go directly to Comments. Geometry of source = flush to surface, except for proportional probes = 1/4" from surface unless otherwise specified.)

PLATEAU DATA

Alpha Source: Th-230

HV (Alpha)	Response CPM A ch.	Background CPM A ch.	Net Eff.
N/A			

Beta Source: Tc-99

HV (Beta)	Response CPM B ch.	Background CPM B ch.	Net Eff.
N/A			

2 Pi Efficiencies:

Pu-239	Tc-99	Th-230	SrY-90
38.24%	40.81%	33.57%	54.91%

Comments: Married as a set with: Model: 2241-3 Serial #: 253356 Bar Code #:

Calibrated with 5' cable. C-14 count = 8704 cpm. 4pi C-14 efficiency = 12.45%, 2pi C-14 efficiency is 32.58%. DET 1 = 1750 V, DET 3 = 1125 V.

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 08/21/15

Performed by: [signature] Reviewed by: [signature] Date: 8-25-14

Printed Name: Carl Hall

SEC INSTRUMENTATION SERVICES
10512 Lexington Drive
Suite 200
Knoxville, TN 37932

C-14 SOURCE CALIBRATION FORM

Probe Model Number : 43-68 **Customer Name :** Chase Environmental
Probe Serial Number : PR289219 **Technician :** Carl Hall
Date of Calibration : 8/21/2014

Instruments used during calibration					
Model Number:	2241-3	Serial Number:	253356	Calibration Due Date:	8/21/2015
Model Number:		Serial Number:		Calibration Due Date:	

NIST Traceable Source(s) used :

	Source S/N	Emission Rate	Activity(s) 2 Pi (cpm)	uCi	4Pi (dpm)	Assay Date
1> C-14	DX 295	432	25,920	0.0305405	67,800	5/3/1994

Data

Instrument condition : Sat
High Voltage: 1750

Background: 260

C-14 Count: 8704

2π Efficiency: 32.58%
4π Efficiency: 12.45%

Calibration sticker attached? Yes

Comments : **Married as a set with :** **Model :** 2241-3 **Serial # :** 253356

Date instrument is due for next calibration : 8/21/2015

Performed by : _____ Reviewed by : _____ Date : 8-25-14
Printed Name : Carl Hall

Entered in computer inventory by: _____ Date : _____

SEC INSTRUMENTATION SERVICES

10512 Lexington Drive
Suite 200
Knoxville, TN 37932

SEC Corporate
2800 Solway Road
Knoxville, TN 37931

Model 2241-3 CALIBRATION FORM

Serial number :	238400	Customer Name :	Chase
Previous due date :	1/10/2015	P.O Number :	102624
Date :	11/10/2014	Technician :	Thomas Thompson
		Reason For Calibration :	Short cycle

INSTRUMENT(S) USED DURING CALIBRATION					
Model Number:	500-2	Serial Number:	190580	Calibration Due date:	7/24/2015
Model Number:		Serial Number:		Calibration Due date:	

Instrument Condition	
As Found	As Left
UNSAT	OK

Threshold	
As Found	As Left
0.0	4.0

Battery Indicator
SAT

SCA/RATE Switch
SAT

	Set Voltage		High Voltage Range	
Detector #	As Found	As Left	As Found	As Left
1	1692	1700	SAT	SAT
2	1867	1875	SAT	SAT
3	1246	1250	SAT	SAT
4	1295	1300	SAT	SAT

Digital Scaler				
Target	As Found	%Error	As Left	%Error
250	0	100.00%	250	0.00%
2,500	0	100.00%	2,507	0.28%
25,000	0	100.00%	25,075	0.30%
250,000	0	100.00%	250,754	0.30%

Reproducability		
x.1 or x1 Scale		
250	250	250
x1 or x10 Scale		
2500	2500	2500
x10 or x100 Scale		
25K	25K	25K
x100 or x1000 Scale		
250K	250K	250K

OK	Is the As Found Data within 20% of the set point?	OK	Audio Response
OK	Are the individual counts within 10% of the average?	OK	Push Buttons
OK	Fast / Slow response switch functions properly?	OK	RESET
OK	Does Instrument meet final Acceptance Criteria?	OK	Audio Switch
OK	Calibration sticker attached?	OK	Light

Married with:	1700 V	DET 1	Model:	43-68	Serial Number:	PR148820
	1875 V	DET 2	Model:	43-37	Serial Number:	PR147972
	1250 V	DET 3	Model:	43-68	Serial Number:	PR148820
Comments :	1300 V	DET 4	Model:	43-37	Serial Number:	PR147972

Instrument calibrated per SEC-IS-423.
Calibrated 43-68 with 5' cable. Calibrated 43-37 with 10' cable.
Repaired bad electronic component.

Date instrument is due for next calibration : 11/10/2015

Performed by : _____ Date: 11-10-14 Reviewed by: _____ Date: 11/10/14

Printed name : Thomas Thompson

Calibration Certificate

Calibration Certificate for 43-68,Serial # PR148820, Bar Code # ,Property # Chase96

Date: 11/10/14 Date Last Cal. Expires: 01/10/15 Technician: Thomas Thompson

Location: 999999, Reason For Calibration: Short Cycled

EQUIPMENT USED DURING CALIBRATION MODEL: 2241-3 SERIAL #: 238400 CAL DUE 11/10/15

NIST TRACEABLE SOURCES USED	SOURCE	ISOTOPE	ACTIVITY	2π	ASSAY DATE
	4071-02	Th-230	40300 dpm	20,500 cpm	3/8/2011
	4072-02	Tc-99	28300 dpm	17,700 cpm	3/8/2011
	4076-02	Sr-90	12100 dpm	8,490 cpm	3/8/2011
	4079-02	Pu-239	29000 dpm	14,700 cpm	3/8/2011

Efficiencies from last calibration

Pu-239: 20.46 %
Tc-99: 24.69 %
Th-230: 18.08 %
SrY-90: 36.55 %

AS FOUND DATA

AS FOUND Instrument Condition: SAT

Calibration Setpoints

HV (Alpha): 1250 V HV (Beta): 1700 V Threshold: 4 mV

	Alpha		Beta		AF 4 π Efficiencies
Back ground:	0	CPM	0	CPM	
Pu-239:	0	CPM	N/A		0.00%
Tc-99:	N/A		0	CPM	0.00%
Th-230:	0	CPM	N/A		0.00%
SrY-90:	N/A		0	CPM	0.00%

☐ Is the As Found Data within 20% of the efficiency from the last cal.?

AS LEFT Instrument Condition: SAT

AS LEFT DATA after repair, HV adjust or Plateau

HV (Alpha): 1250 V HV (Beta): 1700 V Threshold: 4 mV

	Alpha		Beta		AL 4 π Efficiencies
Back ground:	2	CPM	212	CPM	
Pu-239:	6524	CPM	N/A		22.48%
Tc-99:	N/A		7816	CPM	26.87%
Th-230:	8613	CPM	N/A		21.37%
SrY-90:	N/A		4893	CPM	38.69%

"AF" in the AL Efficiency fields means to refer to the AF Efficiencies in the AS FOUND DATA Section

Reproducibility : Isotope: Sr-90 4787 4704 4785 Average: 4758.7 ☑ Are the individual counts within 10% of the average?

If the As Found data (even after repair) is within 10% of the last calibration, then the technician may N/A Plateau data and go directly to continuity. Geometry of source - flush to surface except gas proportional probes - 1/8" from surface unless otherwise specified.

PLATEAU DATA

Alpha Source: Th-230

HV (Alpha)	Response CPM A ch.	Background CPM A ch.	Net 4π Eff.
N/A			

Beta Source: Tc-99

HV (Beta)	Response CPM B ch.	Background CPM B ch.	Net 4π Eff.
N/A			

2 Pi Efficiencies: Pu-239 44.37% Tc-99 42.96% Th-230 42.00% SrY-90 55.14%

Comments: Married as a set with: Model: 2241-3 Serial #: 238400 Bar Code #:

Unable to provide AF data due to meter damage. DET 1ß 1700V , DET 3 a 1250V. Calibrated for use with 5 foot cable.

☑ Does Instrument Meet Final Acceptance Criteria? ☑ Calibration Sticker Attached?

Date Instrument is Due For Next Calibration: 11/10/15

Performed by: Printed Name: Thomas Thompson

Reviewed by: Date: 11/10/14

SEC INSTRUMENTATION SERVICES

10512 Lexington Drive
Suite 200
Knoxville, TN 37932

C-14 SOURCE CALIBRATION FORM

Probe Model Number : 43-68 **Customer Name :** Chase Environmental
Probe Serial Number : PR148820 **Technician :** Thompson
Date of Calibration : 11/10/2014

Instruments used during calibration					
Model Number:	2241-3	Serial Number:	238400	Calibration Due Date:	11/10/2015
Model Number:		Serial Number:		Calibration Due Date:	

NIST Traceable Source(s) used :

		Activity(s)				
	Source S/N	Emission Rate	2 PI (cpm)	uCi	4Pi (dpm)	Assay Date
1> C-14	DX 295	432	25,920	0.0305405	67,800	5/3/1994

Data

Instrument condition : Sat
High Voltage: 1700

Background: 212

C-14 Count: 7709

2π Efficiency: 28.92%
4π Efficiency: 11.06%

Calibration sticker attached? Yes

Comments : **Married as a set with :** **Model :** 2241-3 **Serial # :** 238400

Date instrument is due for next calibration : 11/10/2015

Performed by : _____ Reviewed by : _____ Date : 11/20/14
Printed Name : Thompson
Entered in computer inventory by: _____ Date : 11-20-14

PerkinElmer 2200 Warrenville Road Downers Grove, IL 60515 Tel. No. 630 969-6000 Fax No. 630 322-5510

PerkinElmer®

Certificate of Radioactivity / Traceability

Product	^{3}H PICO Quenched Standard Set
Part Number	6008401
Radionuclide	^{3}H (Tritium) - Toluene
Lot No. = Assay Date	January 6, 2012
Assayed Value	274,200 dpm/std. ± 1.6% ~ 1.235 µCi/set
Serial Number	3
Expiration Date	January 6, 2017

REFERENCE STANDARD: National Institute of Standards and Technology SRM 4947C

METHOD OF STANDARDIZATION:
The bulk solution is standardized by liquid scintillation counting using SRM 4947C as the reference material.

COMMENTS:
The dpm value of each set of standards is confirmed by liquid scintillation counting against a reference standard set. The assigned value is automatically calculated by the liquid scintillation spectrometer using an appropriate algorithm.

I hereby certify that the above information is accurate.

Approved by: *Lilibeth Valero* **Date:** January 27, 2012

Chemist

CN 8845300

PerkinElmer 2200 Warrenville Road Downers Grove, IL 60515 Tel. No. 630 969-6000 Fax No. 630 322-5510

PerkinElmer®

Certificate of Radioactivity / Traceability

Product	^{14}C PICO Quenched Standard Set
Part Number	6008402
Radionuclide	^{14}C (Carbon-14) - Toluene
Lot No. = Assay Date	January 6, 2012
Assayed Value	128,500 dpm/std. ± 1.3% ~ 0.579 µCi/set
Serial Number	2
Expiration Date	January 6, 2017

REFERENCE STANDARD: National Institute of Standards and Technology SRM 4222C

METHOD OF STANDARDIZATION:
The bulk solution is standardized by liquid scintillation counting using SRM 4222C as the reference material.

COMMENTS:
The dpm value of each set of standards is confirmed by liquid scintillation counting against a reference standard set. The assigned value is automatically calculated by the liquid scintillation spectrometer using an appropriate algorithm.

I hereby certify that the above information is accurate.

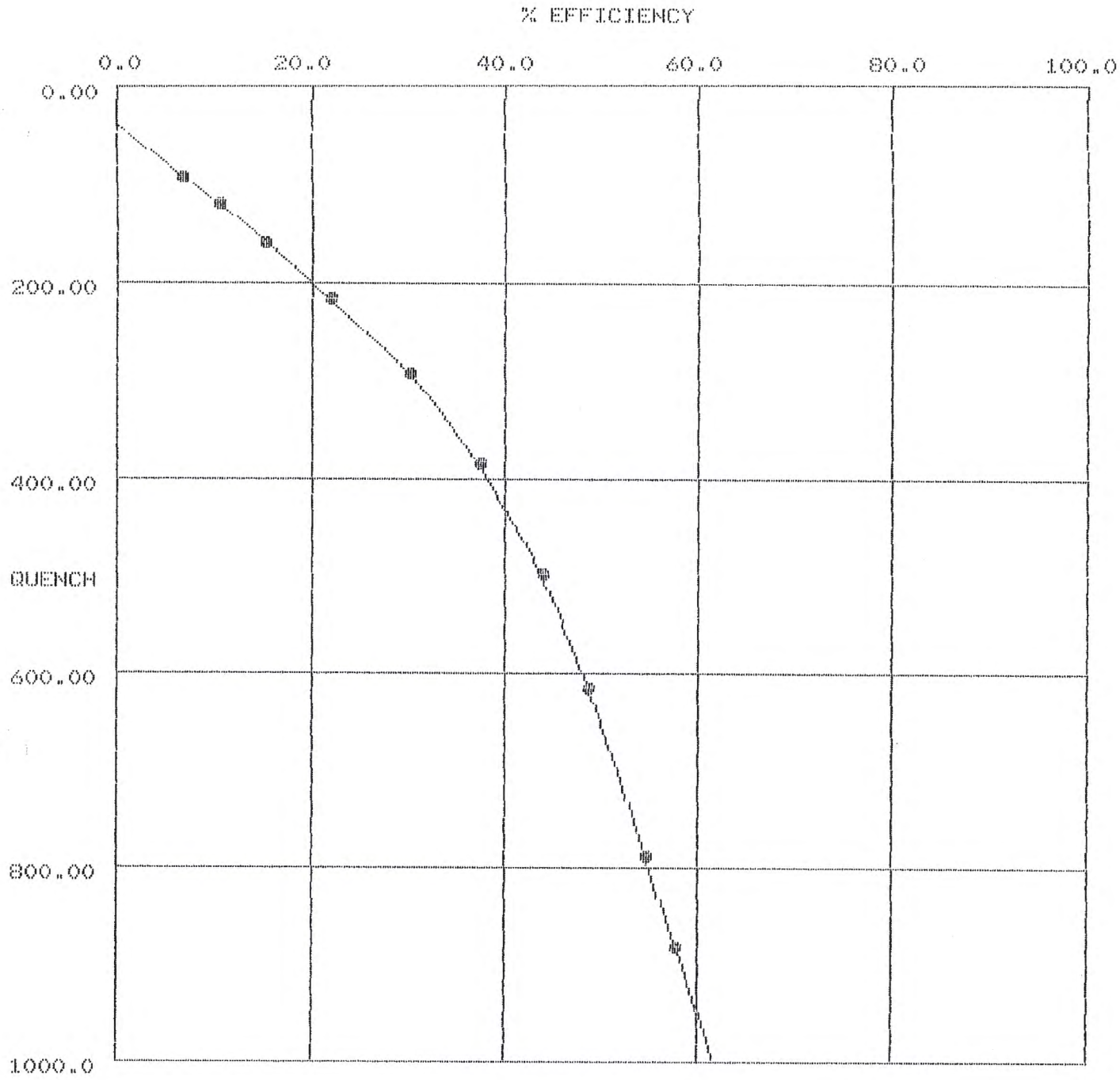
Approved by: *Lilibeth Valero* **Date:** January 27, 2012

Chemist

CN 8845302

Protocol #:28 Name:H3/C14/OPEN 7ML 05-Jun-2015 12:23
Region A: LL-UL= 0.0-12.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.50
Region B: LL-UL=12.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 2.00 QIP = tSIE/AEC ES Terminator = Count
onventional DPM
Nuclide 1 = 2226287 Nuclide 2 = 128447

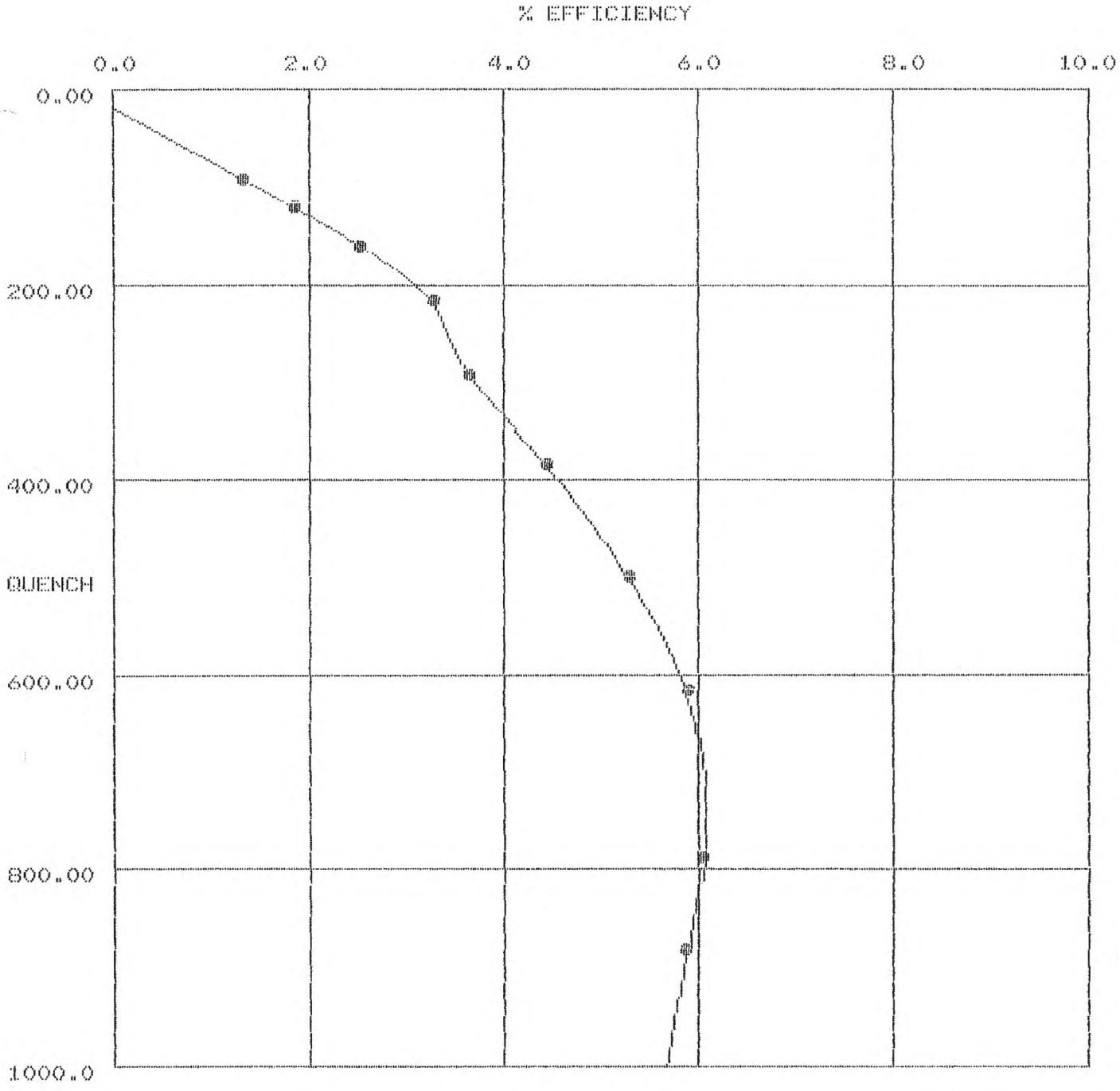
SN	CPMA	DPM1	CPMB	DPM2	SIS	tSIE
1	131168.		13343.1		19.009	882.
2	124131.		13734.3		17.677	791.
3	110862.		13353.5		14.923	619.
4	99583.7		12013.2		13.001	500.
5	85162.6		10119.9		11.189	387.
6	68587.3		8277.20		9.653	294.
7	50292.3		7455.18		8.411	218.
8	35018.4		5757.63		7.441	159.
9	24242.4		4220.07		6.828	122.
10	15750.8		3043.68		6.426	92.9



QUENCH	ELA
92.85	6.96
218.19	22.23
500.23	44.01
882.10	57.97

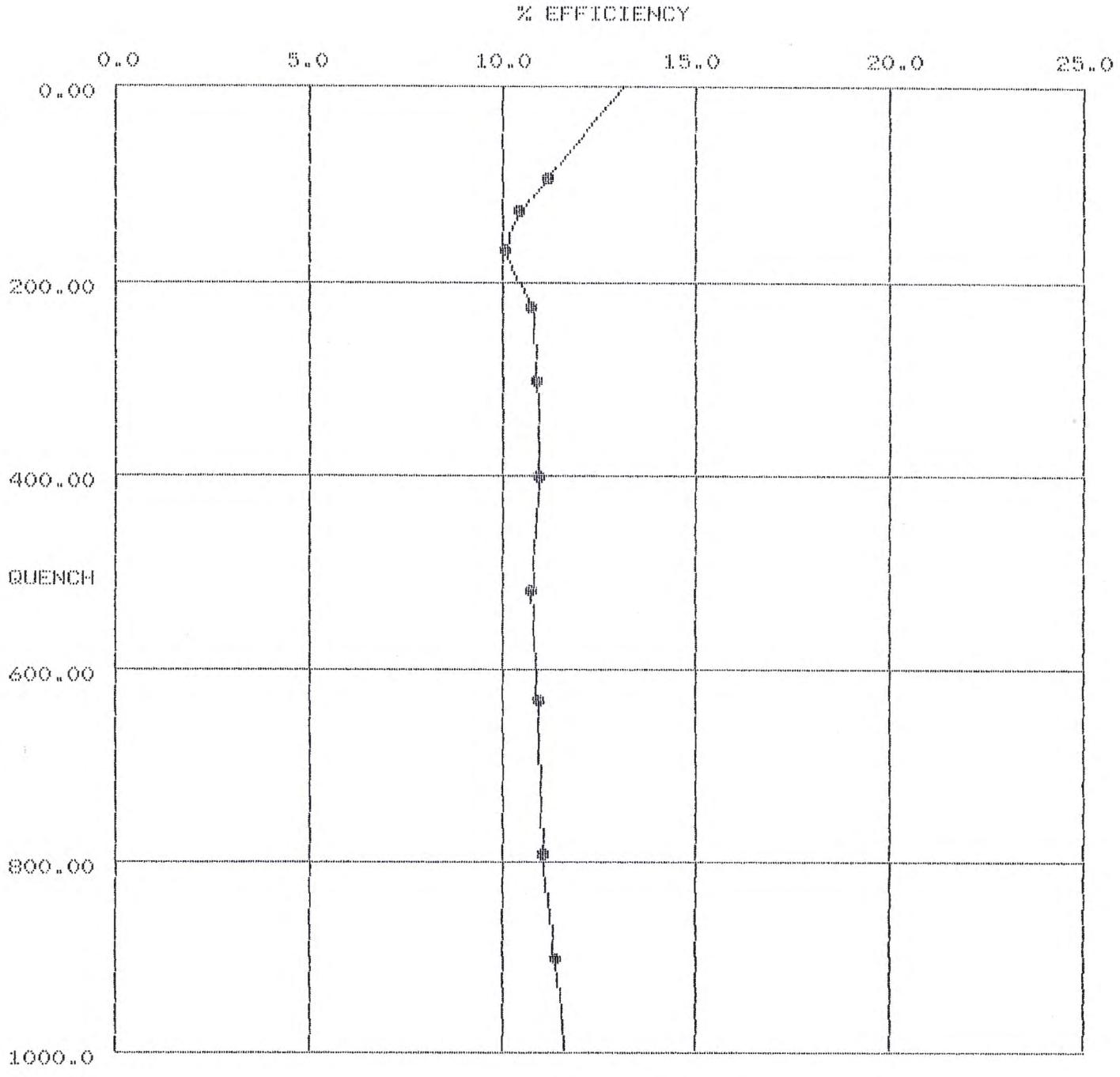
QUENCH	ELA
121.51	10.71
293.55	30.31
618.64	48.99

QUENCH	ELA
158.80	15.48
387.15	37.63
791.35	54.86

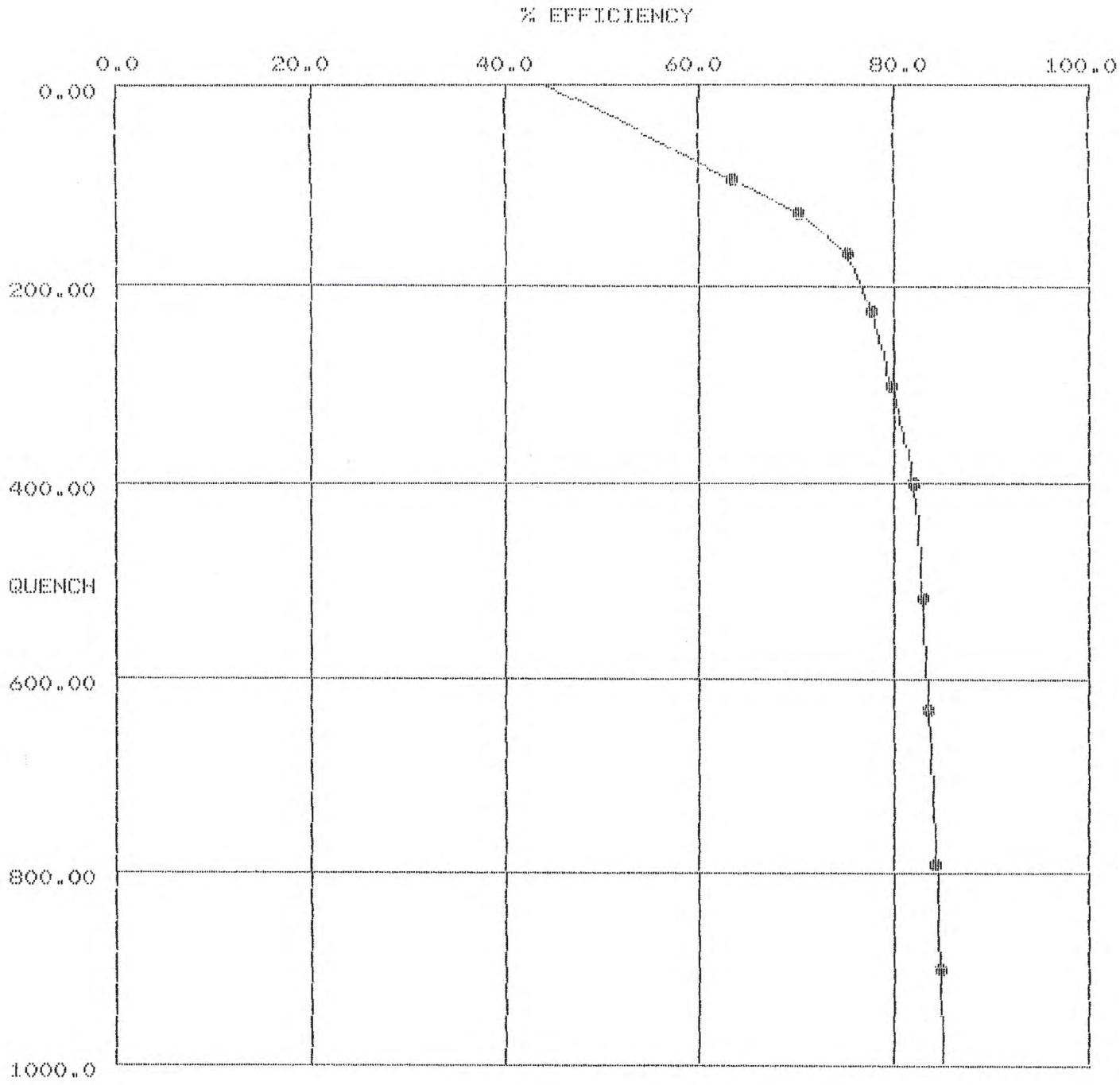


QUENCH	ELB	QUENCH	ELB	QUENCH	ELB
92.85	1.35	121.51	1.86	158.80	2.54
218.19	3.29	293.55	3.66	387.15	4.47
500.23	5.31	618.64	5.90	791.35	6.07
882.10	5.90				

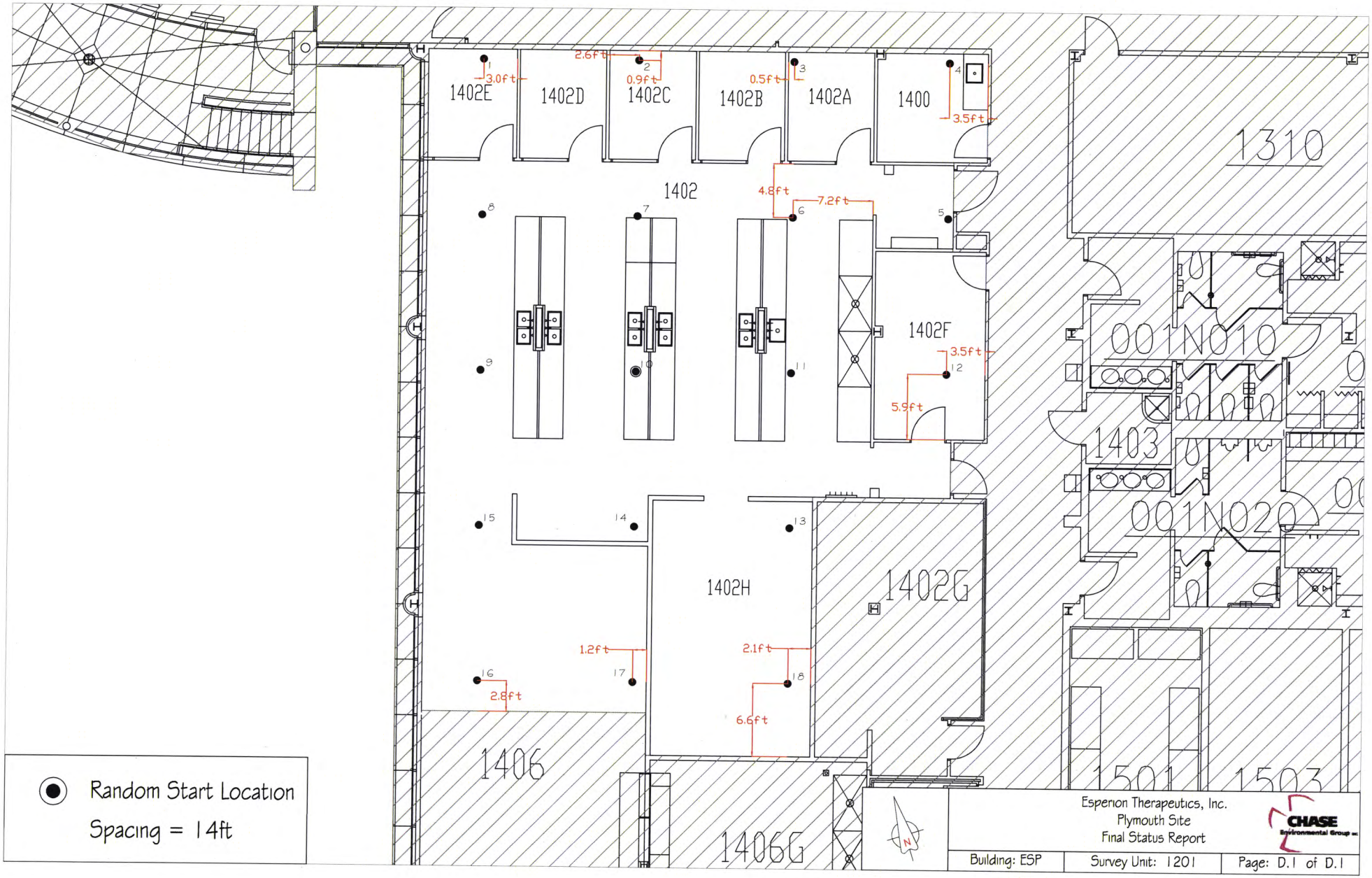
S#	CPMA	DPM1	CPMB	DPM2	SIS	tSIE
11	14674.7		109000.		156.61	903.
12	14258.0		108531.		137.39	793.
13	14080.1		107520.		111.46	635.
14	13868.1		106703.		92.043	520.
15	14086.2		105612.		72.176	403.
16	14048.5		102698.		55.979	305.
17	13886.2		100095.		42.247	227.
18	12976.2		96808.8		32.741	169.
19	13483.5		90425.0		25.836	128.
20	14371.4		81718.1		20.087	95.1



QUENCH	EHA	QUENCH	EHA	QUENCH	EHA
95.06	11.19	128.10	10.50	168.75	10.10
226.90	10.81	305.07	10.94	402.74	10.97
519.65	10.80	635.39	10.96	793.37	11.10
903.19	11.42				

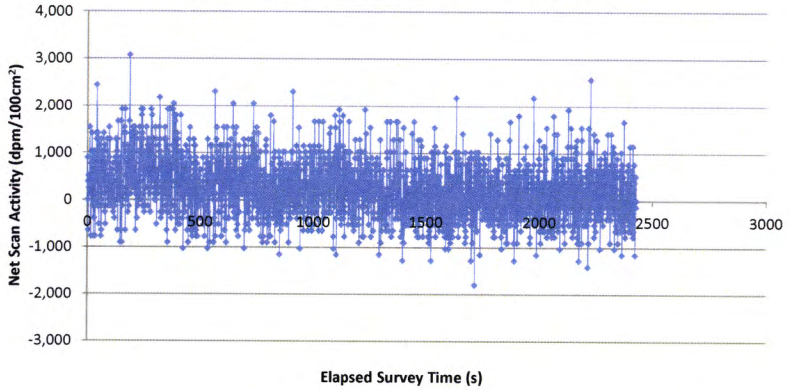


QUENCH	EHB	QUENCH	EHB	QUENCH	EHB
95.06	63.62	128.10	70.40	168.75	75.37
226.90	77.93	305.07	79.95	402.74	82.22
519.65	83.07	635.39	83.71	793.37	84.49
903.19	84.86				


1402E
1402D
1402C
1402B
1402A
1400
1402
1402F
1402H
1402G
1406
1406G
1310
001N010
1403
001N020
1501
1503
3.0ft
2.6ft
0.9ft
0.5ft
3.5ft
4.8ft
7.2ft
3.5ft
5.9ft
1.2ft
2.8ft
2.1ft
6.6ft
Random Start Location
Spacing = 14ft
Esperion Therapeutics, Inc.
Plymouth Site
Final Status Report
CHASE Environmental Group Inc.
Building: ESP
Survey Unit: 1201
Page: D.1 of D.1

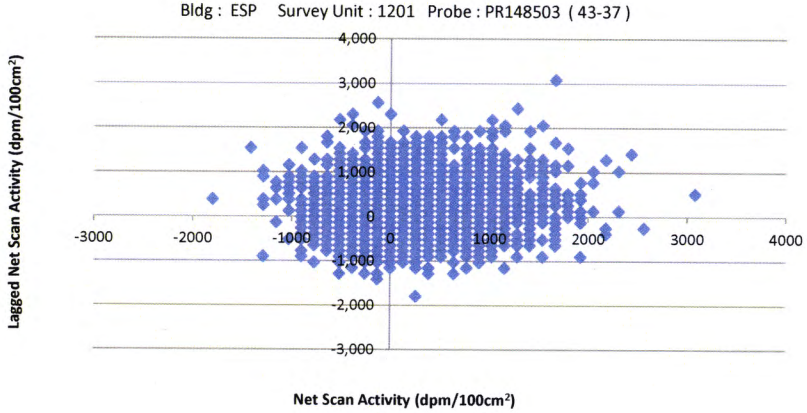
Scan Data

Bldg : ESP Survey Unit : 1201 Probe : PR148503 (43-37)



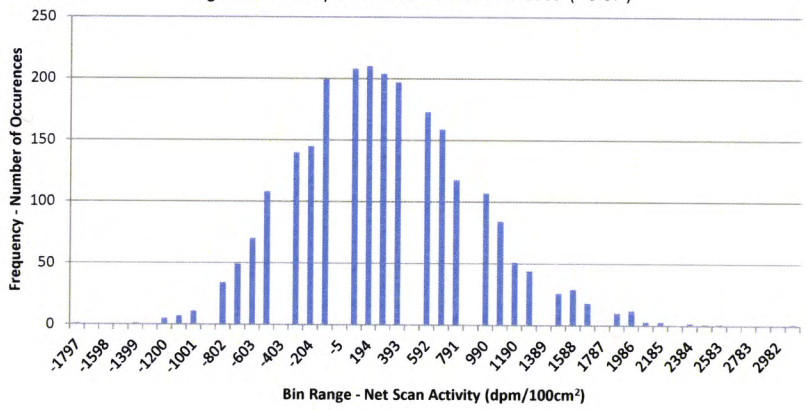
Lagged Scan Data

Bldg : ESP Survey Unit : 1201 Probe : PR148503 (43-37)



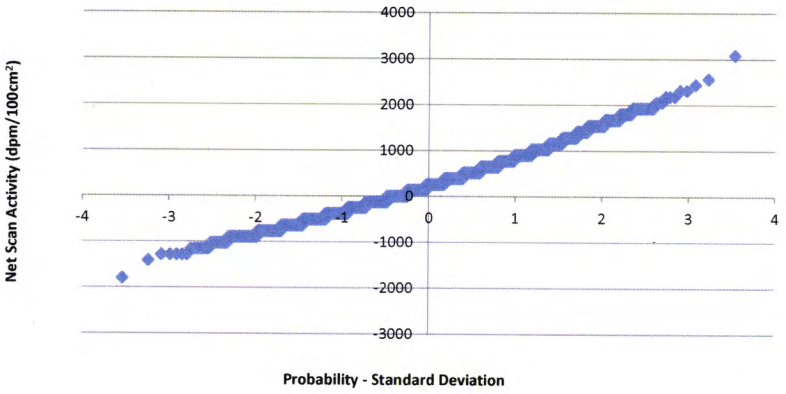
Histogram of Scan Data

Bldg : ESP Survey Unit : 1201 Probe : PR148503 (43-37)



Normal Probability Plot of Data

Bldg : ESP Survey Unit : 1201 Probe : PR148503 (43-37)



Structural Surfaces Survey Results

Building: ESP **Survey Unit: 1201** **Class: 2**

	Total Activity Measurements		Removable Activity Measurements					
Location Code	Activity	MDC	H-3	MDC	C-14	MDC	CH C	MDCR
ESP-1201-F1-M-001	768 +/- 1,888	3,351	7	44	11	26	23	36
ESP-1201-F1-M-002	988 +/- 1,912	3,351	26	44	13	26	35	36
ESP-1201-F1-M-003	329 +/- 1,838	3,351	30	44	17	26	**42**	36
ESP-1201-F1-V-004	0 +/- 1,800	3,351	6	44	10	26	19	36
ESP-1201-F1-V-005	1,537 +/- 1,972	3,351	21	44	19	26	33	36
ESP-1201-F1-V-006	-1,098 +/- 1,667	3,351	12	44	2	26	17	36
ESP-1201-F1-V-007	1,207 +/- 1,936	3,351	0	44	12	26	13	36
ESP-1201-F1-V-008	-220 +/- 1,774	3,351	27	44	6	26	24	36
ESP-1201-F1-V-009	329 +/- 1,838	3,351	6	44	19	26	31	36
ESP-1201-B1-M-010	439 +/- 1,851	3,351	14	44	15	26	32	36
ESP-1201-F1-V-011	-878 +/- 1,694	3,351	37	44	7	26	32	36
ESP-1201-F1-V-012	-988 +/- 1,680	3,351	13	44	12	26	30	36
ESP-1201-B1-M-013	-110 +/- 1,787	3,351	16	44	14	26	26	36
ESP-1201-B1-M-014	-110 +/- 1,787	3,351	29	44	9	26	32	36
ESP-1201-F1-V-015	-110 +/- 1,787	3,351	14	44	12	26	25	36
ESP-1201-F1-V-016	439 +/- 1,851	3,351	8	44	15	26	24	36
ESP-1201-F1-V-017	439 +/- 1,851	3,351	22	44	7	26	27	36
ESP-1201-F1-V-018	988 +/- 1,912	3,351	26	44	14	26	**39**	36
Sample Count	18							
Average	219		17		12		28	
Minimum	-1,098		0		2		13	
Maximum	1,537		37		19		42	
Standard Deviation	741		10		5		7	

Results for Total Activity reported in net dpm/100cm².
Results above MDC are in bold print. Results above Investigation Levels are in red print.
Removable Activity: H-3 = 0-12 keV, C-14 = 12-156 keV, CH C = 0-2,000 keV
Removable Activity: Results for H-3 and C-14 reported in gross dpm/100cm². CH C reported in gross cpm/100cm².

System Survey Results

Building: ESP **Survey Unit: DR01** **Class: N/A**

	Total Activity Measurements		Removable Activity Measurements					
Location Code	Activity	MDC	H-3	MDC	C-14	MDC	CH C	MDCR
ESP-DR01-D1-M-001	+/-		26	44	21	26	**39**	36
ESP-DR01-D1-M-002	+/-		2	44	18	26	22	36
ESP-DR01-D3-M-003	+/-		4	44	21	26	28	36
ESP-DR01-D3-M-004	+/-		17	44	12	26	21	36
ESP-DR01-D3-M-005	+/-		0	44	24	26	29	36
ESP-DR01-D3-M-006	+/-		28	44	9	26	28	36
ESP-DR01-D3-M-007	+/-		0	44	14	26	8	36
ESP-DR01-D3-M-008	+/-		**44**	44	5	26	32	36
ESP-DR01-D3-M-009	+/-		21	44	**112**	26	**125**	36
ESP-DR01-D3-M-010	+/-		15	44	25	26	36	36
ESP-DR01-D2-M-011	+/-		7	44	18	26	27	36
Static Count	0	Sample Count	11					
Average			15		25		36	
Minimum			0		5		8	
Maximum			44		112		125	
Standard Deviation			14		29		31	

Results for Total Activity reported in net dpm/100cm².
Results above MDC are in bold print. Results above Investigation Levels are in red print.
Removable Activity: H-3 = 0-12 keV, C-14 = 12-156 keV, CH C = 0-2,000 keV
Removable Activity: Results for H-3 and C-14 reported in gross dpm/100cm². CH C reported in gross cpm/100cm².
Vacuum results are reported in result / swab.

System Survey Results

Building: ESP Survey Unit: VA01 Class: N/A

	Total Activity Measurements		Removable Activity Measurements					
Location Code	Activity	MDC	H-3	MDC	C-14	MDC	CH C	MDCR
ESP-VA01-V1-M-001	+/-		241	44	9,614	26	9,157	36
ESP-VA01-V2-M-002	+/-		42	44	13	26	32	36
ESP-VA01-V1-M-003	+/-		10	44	13	26	22	36
ESP-VA01-V1-M-004	+/-		0	44	11	26	4	36
ESP-VA01-V1-M-005	+/-		8	44	18	26	26	36
ESP-VA01-V1-M-006	+/-		0	44	20	26	20	36
ESP-VA01-V1-M-007	+/-		0	44	11	26	17	36
ESP-VA01-V1-M-008	+/-		0	44	17	26	19	36
ESP-VA01-V1-M-009	+/-		23	44	12	26	20	36
ESP-VA01-V1-M-010	+/-		18	44	11	26	24	36
ESP-VA01-V1-M-011	+/-		34	44	**82**	26	**100**	36
ESP-VA01-V1-M-012	+/-		2	44	14	26	24	36
ESP-VA01-V1-M-013	+/-		11	44	18	26	27	36
Static Count	0	Sample Count	13					
Average			30		758		730	
Minimum			0		11		4	
Maximum			241		9,614		9,157	
Standard Deviation			65		2,661		2,532	

Results for Total Activity reported in net dpm/100cm².
Results above MDC are in bold print. Results above Investigation Levels are in red print.
Removable Activity: H-3 = 0-12 keV, C-14 = 12-156 keV, CH C = 0-2,000 keV
Removable Activity: Results for H-3 and C-14 reported in gross dpm/100cm². CH C reported in gross cpm/100cm².
Vacuum results are reported in result / swab.

System Survey Results

Building: ESP Survey Unit: VE01 Class: N/A

	Total Activity Measurements		Removable Activity Measurements					
Location Code	Activity	MDC	H-3	MDC	C-14	MDC	CH C	MDCR
ESP-VE01-E1-M-001	292 +/- 1,467	2,691	4	44	**26**	26	33	36
ESP-VE01-E1-M-002	-1,267 +/- 1,252	2,691	7	44	13	26	23	36
ESP-VE01-E1-M-003	+/-		11	44	14	26	27	36
ESP-VE01-E1-M-004	+/-		0	44	11	26	12	36
ESP-VE01-E1-M-005	+/-		23	44	8	26	30	36
ESP-VE01-E1-M-006	+/-		0	44	16	26	23	36
ESP-VE01-E1-M-007	+/-		16	44	11	26	28	36
ESP-VE01-E1-M-008	+/-		18	44	13	26	28	36
ESP-VE01-E1-M-009	+/-		8	44	7	26	18	36
ESP-VE01-E1-M-010	+/-		0	44	20	26	25	36
ESP-VE01-E1-M-011	+/-		2	44	12	26	18	36
ESP-VE01-E1-M-012	+/-		0	44	17	26	23	36
ESP-VE01-E2-M-013	+/-		4	44	9	26	21	36
ESP-VE01-E1-M-014	+/-		8	44	6	26	16	36
ESP-VE01-E2-M-015	+/-		22	44	16	26	**38**	36
ESP-VE01-E3-M-016	+/-		13	44	12	26	23	36
ESP-VE01-E3-M-017	+/-		15	44	10	26	28	36
Static Count	2	Sample Count	17					
Average	-488		9		13		24	
Minimum	-1,267		0		6		12	
Maximum	292		23		26		38	
Standard Deviation	1,102		8		5		6	

Results for Total Activity reported in net dpm/100cm².
Results above MDC are in bold print. Results above Investigation Levels are in red print.
Removable Activity: H-3 = 0-12 keV, C-14 = 12-156 keV, CH C = 0-2,000 keV
Removable Activity: Results for H-3 and C-14 reported in gross dpm/100cm². CH C reported in gross cpm/100cm².
Vacuum results are reported in result / swab.

QA Survey Results

Building: ESP Survey Unit: QA01 Class: N/A

	Total Activity Measurements		Removable Activity Measurements					
Location Code	Activity	MDC	H-3	MDC	C-14	MDC	CH C	MDCR
ESP-QA01-F1-V-001	-549 +/- 1,680	3,263	0	44	13	26	25	36
ESP-QA01-F1-V-002	220 +/- 1,774	3,263	26	44	8	26	24	36
ESP-QA01-B1-M-003	-878 +/- 1,639	3,263	0	44	15	26	14	36
ESP-QA01-F1-V-004	-329 +/- 1,708	3,263	22	44	14	26	32	36
ESP-QA01-F1-V-005	549 +/- 1,813	3,263	4	44	15	26	28	36
Sample Count	5							
Average	-197		11		13		25	
Minimum	-878		0		8		14	
Maximum	549		26		15		32	
Standard Deviation	578		12		3		7	

Results for Total Activity reported in net dpm/100cm².
Results above MDC are in bold print. Results above Investigation Levels are in red print.
Removable Activity: H-3 = 0-12 keV, C-14 = 12-156 keV, CH C = 0-2,000 keV
Removable Activity: Results for H-3 and C-14 reported in gross dpm/100cm². CH C reported in gross cpm/100cm².

NRC FORM 314 (4-2008)
10 CFR 30.36(j)(1); 40.42(j)(1); 70.38(j)(1); and 72.54(k)(5)(i)(1)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0028 EXPIRES: 08/31/2010

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 and FOIA/Privacy Services Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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.

CERTIFICATE OF DISPOSITION OF MATERIALS

LICENSEE NAME AND ADDRESS	LICENSE NUMBER	DOCKET NUMBER
Esperion Therapeutics, Inc. **46701 Commerce Center Drive, Suite B** **Plymouth, MI 48170**	**21-32115-02**	**030-37940**
	LICENSE EXPIRATION DATE **04/30/2019**	

A. LICENSE STATUS *(Check the appropriate box)*

☐ This license has expired. ☑ 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:

☑ b. Disposal of radioactive materials:

☐ 1. Directly by the licensee:

☐ 2. By licensed disposal site:

☑ 3. By waste contractor:

Chase Environmental Group transported waste to licensed waste processing and disposal sites. See attached manifests.

☑ 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 radioactive 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
Clay Cramer	**Radiation Safety Officer**	**(734) 887-3922**	**ccramer@esperion.com**

Mail all future correspondence regarding this license to:
3891 Ranchero Dr., Suite 150, Ann Arbor, MI 48108

C. CERTIFYING OFFICIAL

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

PRINTED NAME AND TITLE	SIGNATURE	DATE
Tim M. Mayleben	T Mayl	6-25-15

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.

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1 EMERGENCY TELEPHONE NUMBE (INCLUDE AREA CODE)
800-424-9300

ORGANIZATION
Chemtrec WSDS #: CHEN01RAD

[ ] YES
[x] NO

2 TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 2

[ ] YES
[x] NO

GAS MANIFEST NUMBER: NA

5 SHIPPER: NAME AND FACILITY
Chase Environmental Group, Inc
11450 Watterson Court
Louisville, KY 40299

SHIPPER ID #: N/A
X COLLECTOR
PROCESSOR

LOW-LEVEL PERMIT NUMBER: T-KY003-L15
SHIPMENT #: N/A
GENERATOR TYPE (SPECIFY):
CONTACT: Janet Baker
TELEPHONE #: 865-250-4593

6 CARRIER NAME AND ADDRESS
SJ Transportation Co., Inc.
PO Box 169
Woodstown, NJ 08098

EPA ID #: NJD071529976
SHIPPING DATE: 6/25/2015
CONTACT: Kevin Elder
TELEPHONE #: 856-769-2741
SIGNATURE
DATE: 6-25-15

NRC FORM 540 AND 540A — PAGE 1 __1__ PAGE(S)
NRC FORM 541 AND 541A — OF __1__ PAGE(S)
NRC FORM 542 AND 542A — __1__ PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8 CONSIGNEE NAME AND FACILITY ADDRESS
Alaron Corporation
2138 State Route 18
Wampum, PA 16157

SIGNATURE-Authorized consignee acknowledging waste receipt:

8 Manifest Number
(Use this number on all continuation pages)
AL-2015-162

Contact: Mike Otlowski
Telephone Number (Include area code): 724-535-5777
Date:

10. Certification

This is to certify that the herein-named materials are acceptable for disposal, are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the Commission.

AUTHORIZED SIGNATURE: [signature] TITLE: 6-25-15 tech DATE: 6-25-15

HM	11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number, and any additional information)	12 DOT LABEL "RADIOACTIVE"	13 TRANSPORT INDEX	14 PHYSICAL AND CHEMICAL FORM	15 INDIVIDUAL RADIONUCLIDES	16 TOTAL PACKAGE ACTIVITY IN MBq	17 LSA/SCO CLASS	18 TOTAL WEIGHT OR VOLUME m^3	19 ID NUMBER OF PACKAGE
	Non DOT Regulated Material One cubic yard sack with DAW for disposal	NA	NA	Solid/Oxide	C-14; H-3	1.32E+03	NA	0.764	AL-CT-W-15-368
	Non DOT Regulated Material One drum with vials for disposal	NA	NA	Liquid/Oxide	C-14; H-3	2.22E+01	NA	0.212	AL-VL-W-15-369

Generator Certification Statement:
The constituents of the waste manifested herein are known to the generator. There are no EPA RCRA, pathogenic or other hazards present other than those specifically listed on the Form 541.

Clay T. Cramer — Print name
[signature] — Signature
25 Jun 15 — Date

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER (INCLUDE AREA CODE)	800-424-9300
ORGANIZATION	Chemtrec WSDS #: CHEN01RAD
IS THIS AN EXCLUSIVE USE SHIPMENT? [ ] YES [X] NO	3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 2
4. DOES ANY MATERIAL IN THIS SHIPMENT REQUIRE A MANIFEST FOR SHIPMENT? [ ] YES [X] NO	EPA MANIFEST NUMBER: NA

5. SHIPPER- NAME AND FACILITY	Chase Environmental Group, Inc 11450 Watterson Court Louisville, KY 40299
SHIPPER ID #	N/A
	X COLLECTOR PROCESSOR
USER PERMIT NUMBER	T-KY003-L15
SHIPMENT #	N/A
GENERATOR TYPE (SPECIFY)	
CONTACT	Janet Baker
TELEPHONE #	865-250-4593
6. CARRIER NAME AND ADDRESS	SJ Transportation Co., Inc. PO Box 169 Woodstown, NJ 08098
EPA ID #	NJD071629976
SHIPPING DATE	6/25/2015
CONTACT	Kevin Elder
TELEPHONE #	856-769-2741
SIGNATURE	
DATE	6-25-15

NRC FORM 540 AND 540A	PAGE 1 __1__ PAGE(S)
NRC FORM 541 AND 541A	OF __1__ PAGE(S)
NRC FORM 542 AND 542A	__1__ PAGE(S)
ADDITIONAL INFORMATION	None PAGE(S)
8. Manifest Number (Use this number on all continuation pages)	GT-2015-183
9. CONSIGNEE- NAME AND FACILITY ADDRESS	Duratek Services, Inc. 1560 Bear creek Road Oak Ridge, TN 37830
Contact	Donnie Bracket
Telephone Number (Include area code)	865-481-0222
SIGNATURE (Authorized consignee acknowledging waste receipt)	
Date	

10. Certification

This is to certify that the herein-named materials are acceptable for disposal, are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the Commission.

AUTHORIZED SIGNATURE: [signature] TITLE: Tech DATE: 6-25-15

HM	11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number and any additional information)	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES	16. TOTAL PACKAGE ACTIVITY IN MBq	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME m^3	18. ID NUMBER OF PACKAGE
	Non DOT Regulated Material One drum with animals for incineration	NA	NA	Solid/Oxide	H-3	7.96E+01	NA	0.114	GT-AN-E-15-370
	Non DOT Regulated Material One drum with animals for incineration	NA	NA	Solid/Oxide	H-3	7.96E+01	NA	0.114	GT-AN-E-15-371

Generator Certification Statement:
The constituents of the waste manifested herein are known to this generator. There are no EPA RCRA, pathogenic or other hazards present other than those specifically listed on the Form 541.

CLAY T. CRAMER — Print name

[signature] — Signature

25 Jun 15 — Date

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER (INCLUDE AREA CODE)	800-424-9300
ORGANIZATION	Chemtrec WSDS #: CHEN01RAD
[ ] YES [X] NO	2. TOTAL NUMBER OF PACKAGES IDENTIFIED ENTERED ON THIS MANIFEST: 2
[X] YES [ ] NO	EPA MANIFEST NUMBER: 008275811 FLE

5. SHIPPER- NAME AND FACILITY	Chase Environmental Group, Inc 11450 Watterson Court Louisville, KY 40299
USEPA PERMIT NUMBER / SHIPMENT #	T-KY003-L15 / N/A
CONTACT	Janet Baker
TELEPHONE #	865-250-4583
6. CARRIER NAME AND ADDRESS	SJ Transportation Co., Inc. PO Box 169 Woodstown, NJ 08098
EPA ID #	NJD071629976
SHIPPING DATE	6/25/2015
CONTACT	Kevin Elder
TELEPHONE #	856-769-2741
SIGNATURE / DATE	6-25-15

SHIPPER ID #	N/A
[ ]	COLLECTOR
[X]	PROCESSOR
DESIGNATOR TYPE (SPECIFY)	
7. CONSIGNEE-NAME AND FACILITY ADDRESS	NSSI, Inc. 5711 Etheridge Road Houston, TX 77087
SIGNATURE (consignee acknowledging waste receipt)	
AUTHORIZED SIGNATURE / TITLE / DATE	Tech 6-25-15

PAGE 1 OF	1 PAGE(S) 1 PAGE(S) 1 PAGE(S) None PAGE(S)
8. Manifest Number (Use this number on all continuation pages)	NS-2015-179
Contact	Einar Goerland
Telephone Number (Include area code)	713-641-0391
Date	

10. Certification

This is to certify that the herein-named materials are acceptable for disposal, are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the Commission.

HM	11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12. CDT LABEL / HEADING(S)	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES	16. TOTAL PACKAGE ACTIVITY IN MBq	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME m^3	19. ID NUMBER OF PACKAGE
X	UN1993 Waste Flammable liquids, n.o.s., 3, PG II (Contains toluene) One pail with standards for disposal	NA	NA	Liquid/Solvent	C-14; H-3	2.78E-03	NA	0.019	NS-LP-E-15-363
X	UN1993 Waste Flammable liquids, n.o.s., 3, PG II (Contains methanol) One flammable lab pack for disposal	NA	NA	Liquid/Solvent	C-14	3.96E-01	NA	0.019	NS-LP-E-15-364

Generator Certification Statement:
The constituents of the waste manifested herein are known to the generator. There are no EPA RCRA, pathogenic or other hazards present other than those specifically listed on the Form 541.

Print name	Signature	Date
CLAY T. CRAMER		25 JUN 15

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

Licitra, Carl

From: Forster, Sara
Sent: Thursday, July 02, 2015 9:48 AM
To: Licitra, Carl
Cc: Tomczak, Tammy; Lee, Peter
Subject: FW: NRC Material License No.: 21-32115-02
Attachments: Esperion License Termination Request Final 26JUN15.pdf; Esperion Therapeutics FSSR 6-25-15.pdf; Esperion Therapeutics, FSSR, Appendices.pdf; NRC Form 314 - Fully Executed 25JUN15.pdf; Esperion License Termination Waste Manifests 6-26-15.pdf

Hi Carl:

Peter received the email below from an NRC licensee, License No. 21-32115-02.

Could you please print out the attachments, this email, and have it scanned into ADAMS. Once it is scanned in, could you please have the document controlled in and placed in a green folder (decommissioning)? The action should be assigned to Peter Lee. I have copied Tammy onto this message if you need help completing our request.

Thank you so so much for your help!

Sara x9892

From: Lee, Peter
Sent: Thursday, July 02, 2015 9:44 AM
To: Forster, Sara
Subject: FW: NRC Material License No.: 21-32115-02

From: Clay Cramer [mailto:ccramer@esperion.com]
Sent: Friday, June 26, 2015 8:29 AM
To: Lee, Peter
Cc: George Evans; Larry J. Kenaga; Mike Culp (mculp@chaseenv.com); Stephen Pinkosky; Narendra Lalwani; Tim Mayleben
Subject: [External_Sender] NRC Material License No.: 21-32115-02

Dr. Lee,
Esperion Therapeutics has permanently ceased all activities under NRC material license 21-32115-02 at our laboratory facility located at 46701 Commerce Center Drive in Plymouth MI. The decommission activities were conducted by Chase Environmental Group, Inc. in accordance with the decommissioning work plan (DWP). The documentation for completion of those activities to support termination of the license and unrestricted release of the facility are attached and listed below:

1. Esperion's memo request for license termination (NRC material license 21-32115-02)
2. Esperion's Decommission Final Status Report
3. Esperion's Decommission Final Status Report Appendices
4. Fully executed NRC Form 314
5. Waste Manifest from Chase Environmental Group, Inc.

An Outlook notice of delivery and opening this correspondence to confirm this delivery of this email has been added. Please feel free to contact me directly as needed. Thank you for your time an attention.

Sincerely,

Clay T. Cramer, M.S.
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