APPENDIX C
PROCEDURES

CN ASSOCIATES
YOUR PARTNER IN RADIATION SAFETY

Building Characterization Procedure for the Former Thermo Eberline LLC Facility

5981 Airport Road, Santa Fe, NM

PROCEDURE NUMBER: CN-SF-RP-001
Revision: 0

Written By: Donald Flahardy, CHP Date: 6/26/2020

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Revision: 0

1.0 Purpose

1.1.1 The Purpose of this procedure is to describe the survey requirements to conduct characterization of building surfaces at the former Thermo Eberline LLC Facility located at 5981 Airport Road, Santa Fe, NM.

2.0 Scope

2.1.1 This applies only to the surveys performed for the conduct of characterization surveys in support of the Draft Work Plan (Work Plan) submitted to the New Mexico Radiation Control Bureau.

3.0 Precautions and Limitations

3.1.1 Follow the applicable precautions and limitations of the associated instrument operating procedures.

4.0 Prerequisites

4.1.1 A Potential Area of Concern (PAOC) has been identified by CN Management to be ready for characterization

4.1.2 The PAOC has:

4.1.2.1 Been classified as a Potential Area of Concern (PAOC) per the Work Plan

4.1.2.2 The grid map coordinates established, and

4.1.2.3 The PAOC has been identified and numbered to facilitate tracking status of building characterization.

5.0 Definitions

5.1.1 *Potential Area of Concern (PAOC)*: A total of six (6) Potential Areas of Concern (PAOCs-1-6) in the building were identified where past RAM use, storage, and/or release is known or suspected to have occurred. These areas within the facility are targeted for characterization by the Work Plan. The six (6) PAOCs consist of an estimated 49,370 square feet of walls, floors and ceiling, and potential entry points for contamination into building structures (drain lines, sinks, lab hoods, HVAC vents, etc.).

5.1.2 *Reference Area* – Surface areas of similar type that should emit a similar background radiation to that of the applicable surface materials within a PAOC. A background reference area has been established as summarized in Attachment A of the Work Plan for surveys of the building interior.

5.1.3 *Grid:* An XYZ coordinate system used as a reference for defining specific locations within a PAOC

6.0 General Requirements

6.1.1 **IDENTIFY** the area to be surveyed and determine the associated PAOC number.

NOTE

The survey maps described below will be provided by CN management. The map for each PAOC will need to be developed individually.

6.1.2 **OBTAIN** the appropriate survey map from the CN management. The survey map should contain the following information:

6.1.2.1 PAOC number

6.1.2.2 Grid map for fixed survey points.

6.1.3 **REFER** to applicable RWPs and/or Job Hazard Analyses associated with a specific PAOC to identify appropriate worker safety precautions/requirements prior to starting work.

6.1.4 **OBTAIN** the required instruments to conduct the fixed point or scan survey per CN Management

6.1.4.1 **PERFORM** and document appropriate QC checks of the instruments in accordance with standard site procedures for the instruments to be used **PRIOR to use.**

6.1.5 **REFER** to Attachment 1 for the general survey requirements associated with the PAOC. More specific survey requirements for a given PAOC may be provided by CN Management and may differ from attachment 1.

NOTE

The survey scan speed and threshold values stated in Section 7.0 are site specific values and need to be verified for each specific site prior to use.

7.0 Conduct of Scan Surveys

7.1.1 **CONDUCT** surface scans using either handheld alpha/beta scintillators or large area proportional counters with a dual window alpha/beta ratemeter (i.e. floor carts).

7.1.2 **PERFORM** all scans keeping the scan probe at approximately 0.25 to 0.5 inches from the surface and moving at a rate of

7.1.2.1 With the alpha background at 6 cpm or less, no more than approximately 2 inches per second for handheld probes such as the Ludlum 43-93 or Ludlum 43-89, or other speed as directed by the Radiation Protection Manager or Health Physics staff.

7.1.2.2 With the alpha background at 20 cpm or less, no more than approximately 6 inches per second for the Ludlum 43-37-1 large area gas proportional probe, or other speed as directed by the Radiation Protection Manager or Health Physics staff.

7.1.3 **Document** area Scanned using one of the following options:

7.1.3.1 Form TFE-01 with reference grid point map

7.1.3.2 Grid point map

7.1.4 **Record** alpha and beta scan results as follows:

7.1.4.1 **RECORD** observed count rate when an increased count rate is observed during scanning

7.1.4.2 **MARK** locations exhibiting elevated readings above background

7.1.4.3 Upon completion of a specific pass on the grid map, **RECORD** the highest alpha and beta cpm observed and grid locations scanned, or

7.1.4.4 When required to change the location of the man-lift, i.e. when performing surveys on the ceiling.

7.1.5 **CONDUCT** a fixed-point measurement, **MARK** the location with chalk or other means and **RECORD** on Attachment 4 the location (grid number, the X, Y or Z coordinates) of any area of elevated activity

7.1.6 **REVIEW** initial survey results with CN management prior to proceeding to Step 8.0.

8.0 Conduct of Fixed-Point Surveys

8.1.1 **ENSURE** that the most recent grid survey with sample points identified has been obtained from CN Management.

8.1.2 At each designated location perform the following measurements:

8.1.2.1 **MEASURE** and **RECORD** gamma dose rates at approximately 1 foot from contact with the location

8.1.2.2 **PERFORM** a 1 to 3-minute fixed point alpha-beta measurement on contact with the surface (Actual count times will depend on site background conditions and may be extended, as feasible, to achieve minimum detectable activity levels sufficient to meet the Surface Release Criteria for target radionuclides in Table 1 from the Work Plan)

8.1.2.2.1.1 **PERFORM** a 1-minute fixed point measurement when the alpha background is 3 cpm or less

8.1.2.2.1.2 **PERFORM** a 2-minute fixed point measurement when the alpha background is between 4 and 8 cpm

8.1.2.2.1.3 **PERFORM** a 3-minute fixed point measurement when the alpha background is between 9 and 10 cpm

8.1.2.2.1.4

8.1.2.2.2 **RECORD** the total counts in both the alpha and beta channel in each measurement interval on Attachment 3.

8.1.2.3 **PERFORM** a loose surface contamination smear survey over 100 cm^2

8.1.2.3.1 **ANAYZE** loose surface contamination smears for alpha and beta radiation using the Ludlum Model 3030 Alpha Beta Sample Counter

8.1.2.3.2 **ANALYZE** loose surface contamination smears for H-3 and C-14 by liquid scintillation

8.1.2.3.3 **SAVE** smears for further analysis as directed by CN Management

9.0 **QC checks Post Survey**

9.1 **PERFORM** and **DOCUMENT** QC checks of the instruments in accordance with standard site procedures on the same day **AFTER** the survey is complete or the next day prior to use of the instrument.

9.0 **Documentation of Surface Measurements**

9.1.1 **REVIEW** Attachments 2 and 3 for completeness and accuracy.

9.1.2 **REVIEW** grid map or survey map showing the areas scanned and that data from Attachment 2 can be correlated to the areas scanned.

9.1.3 **COMPLETE** the associated CN Associates Survey Cover Sheet

9.1.4 **FORWARD** all documentation to CN management for review and data analysis.

10.0 **Volumetric Sampling**

9.1.1 As directed by CN Management, **OBTAIN** volumetric samples in accordance with CN-SF-RP-009 Volumetric Sampling Procedure

9.1.2 **FORWARD** all samples and associated documentation to CN management for review and analysis

NOTE

Section 10 is intended to be used by CN Management

10.0 **Final Disposition of PAOC**

10.1.1 CN Management will complete data analysis and determine additional actions such as additional scanning, additional fixed-point surveys, volumetric sampling, or remediation.

10.1.2 **IF** no additional surveys or remediation is required, **THEN**

10.1.2.1 **POST** and access controlled to the PAOC to prevent potential for cross-contamination

11.0 References

11.1.1 New Mexico Radiation Protection Regulations, General Provisions 20.3.1.1

11.1.2 New Mexico Standards for Protection Against Radiation 20.3.4.1

11.1.3 10 CFR Part 20, "Standards for Protection Against Radiation"

11.1.4 CN-RP-010 Radiological Surveys

11.1.5 CN-SF-RP-004 Use of the Ludlum Model 43-93 Alpha Beta Detector

11.1.6 CN-SF-RP-005 Use of the Ludlum Model 43-37-1 Alpha Beta Detector

11.1.7 CN-SF-RP-006 Use of the Ludlum Model 3030 Alpha Beta Sample Counter

11.1.8 CN-SF-RP-007 Use of the Ludlum Model 19 microR Survey Meter

11.1.9 CN-SF-RP-008 Use of the Triathler Liquid Scintillation Counter

11.1.10 CN-SF-RP-009 Volumetric Sampling Procedure

11.1.11 CN Associates Radiation Safety Program and Manual
11.1.12 C.N. Associates Technical Basis For Scanning MDCs at Thermo Eberline facility
11.1.13 C.N. Associates Technical Basis For Static Measurement MDAs at Thermo Eberline facility

12.0 Attachments

12.1.1 Attachment 1 – Survey Unit requirements
12.1.2 Attachment 2 – Example Survey Unit Scan Results
12.1.3 Attachment 3 – Example Fixed Point Measurement Results
12.1.4 Attachment 4 - Example Elevated Locations Detected During Scanning

ATTACHMENT 1

PAOC	Area	Survey area	Scan Percent	Fixed Point Survey
1-6	Floors	Floor	100%	Fixed grid
1-6	Walls	Walls from Floor level to 7 feet above the floor	100%	Fixed Grid
4,6	Ceilings	Selected Ceilings	100%	Fixed Grid
1-6	potential entry points for contamination into building structures	drain lines, sinks, lab hoods, HVAC vents, etc..	100% accessible point of entry	Point of entry

Attachment 2

Example Characterization Scan Results

PAOC Number: _____ Date of Survey: _____

Location				Gross Alpha Counts (cpm)	Gross Beta Counts (cpm)
Grid/ Pass	X Coordinate	Y Coordinate	Z Coordinate		

Instruments:

Instrument	Serial Number	Cal Due Date	Background (CPM)	QC Checks SAT (Y/N)

HPT Name/Sign: _____ Date: _____

HPT Name/Sign: _____ Date: _____

Reviewer Name/Sign _____ Date:_____

Attachment 3
Example Fixed Point Measurements

PAOC: _____ Static Count Time (minutes): _____

Measurement Number	X Coord	Y Coord	Z Coord	Gross Alpha (cpm)	Gross Beta (cpm)	Gamma Dose rate (μR/hr)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

Instruments:

Instrument	Serial Number	Cal Due Date	Background (CPM)	QC Checks SAT (Y/N)

HPT Name/Sign: _____ Date: _____

HPT Name/Sign: _____ Date: _____

Reviewer Name/Sign _____ Date:_____

Attachment 4
Example Elevated Locations Detected During Scanning

PAOC: _____ Static Count Time (minutes): _____

Grid	X Coord	Y Coord	Z Coord	Gross Alpha (cpm)	Gross Beta (cpm)

Instruments:

Instrument	Serial Number	Cal Due Date	Background (CPM)	QC Checks SAT (Y/N)

HPT Name/Sign: _____ Date: _____

HPT Name/Sign: _____ Date: _____

Reviewer Name/Sign _____ Date:_____