DUPONT

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03020681

May 2, 2018

U.S. Nuclear Regulatory Commission
USNRC – Region I
2100 Renaissance Blvd, Suite 100
King of Prussia, PA 19406-2713

RE: Notification of decommission of the field test plot under the DuPont - US NRC Radioactive Material License Number 07-13441-02 at the Stine-Haskell Research Center.

RECRG1 05OCT18AM0657

To Whom It May Concern:

This letter of notification is provided to advise you that E.I. du Pont de Nemours and Company, Inc. (DuPont) has ceased all licensed activities in the field study plot at the Stine-Haskell Research Center (SHRC) under the DuPont - US NRC Radioactive Material License Number 07-13441-02 and intends to decommission the license designated radioactive field study test plot for future unrestricted use.

A Radiological Scoping Survey was performed in accordance with guidelines provided by the Nuclear Regulatory Commission in the NUREG 1757, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). Please see attachment: Stine Haskell Farm 14C Field Test Plot; Radiological Scoping Survey. The purpose of the Radiological Scoping Survey was to identify and characterize the presence of radioactive contamination in the soil within the perimeter of the 14C field study plot. The survey was designed to also serve as a final status survey for areas where the radionuclide concentrations were found to be below the derived concentration guideline level (DCGL) of 12pCi/g for 14C (NUREG 1757, Vol. 1, Appendix B, Screening Values).

The number of samples and locations followed MARSSIM guidance for Class 1 and Class 3, surveys of the active zones on the site. Analysis of all the soil samples taken from within and around the field study plot were found to be below the defined DCGL for 14C of 12pCi/g (NUREG 1757, Vol. 1, Appendix B, Screening Values, 14C). Results of this survey demonstrate that levels of licensed radioactive material remaining at the 14C Field Study Plot are at levels of ALARA, and that they would not deliver an annual dose of more than the assumed $DCGL_w$ (25 mrem/yr).

Mr. John M. Brisbin, DuPont Radiation Safety Officer, may be contacted for additional information at (302) 695-6896, cell (302) 420-2233, facsimile (302) 695-4032, or by E-mail at JOHN.M.BRISBIN@USA.dupont.com.

Sincerely,

John M. Brisbin
Radiation Safety Officer (RSO)
DuPont Experimental Station, E249/207
200 Powder Mill Road
PO Box 8352
Wilmington, DE 19803

For the US NRC Radioactive Material License Number 07-13441-02
C/o E.I. du Pont de Nemours and Company, Inc.
Experimental Station
200 Powder Mill Road
Wilmington, DE 19803

608757
NMSS/RGN1 MATERIALS-002

DuPont

Stine Haskell Farm 14C Field Test Plot

Stine Haskell Research Center

Newark, DE

RADIOLOGICAL SCOPING SURVEY

September 2017

Report Prepared By: _____

Paul Madairy, CHP

RSO, Inc.

Laurel, MD

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1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

E.I. du Pont de Nemours and Company, Inc. (DuPont) used radioactive Carbon 14 (14C) for plant tracer studies on a Field Test Plot (FTP) at the Stine Haskell Research Center in Newark Delaware. The Field Test Plot (FTP) was used for approximately 20 years and is currently a part of NRC License number 07-13441-02. The use of radioactive material at the FTP has terminated and a scoping survey was commissioned to assess the level of 14C remaining in the soil in preparation to remove the FTP from the Dupont NRC license. The onsite measurements were completed on 09/20/17, and sample collections were completed on 09/20/17 and 09/21/17.

1.2 Historical Site Assessment

The Dupont Radiation Safety Office produced a Historical Site Assessment in June of 2017 in preparation for this survey. See Appendix A for the full document.

HSA Executive Summary:

E.I. du Pont de Nemours and Company, Inc. (DuPont), operating under the conditions of the current DuPont - US NRC Radioactive Material License Number 07-13441-02, intends to decommission for future unrestricted use, the designated radioactive field study plot of the Stine Farm located within the Stine-Haskell Research Center (SHRC). This identified small field plot area was managed and controlled over the course of approximately twenty years as designated by the Radiation Safety Committee and Radiation Safety Program for the use of low level tracer byproduct materials (14C radiolabeled agricultural chemicals only) in support of metabolism, stability, and environmental fate studies related to agricultural chemicals and their associated products.

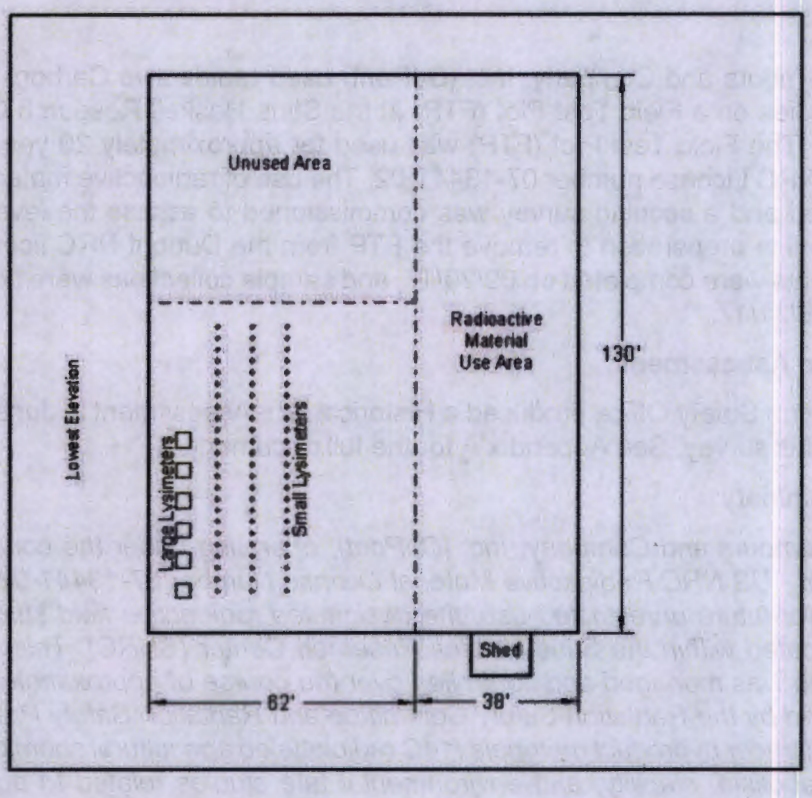
It is the intent of the DuPont Radiation Safety program, to remove this designated area of prior tracer field study activities from NRC approved research purposes for which this location actively used low levels of licensed materials under the current License. All active licensed material use related to this designated area was ceased approximately one decade ago and the last recorded date of active use of these radioactive materials to the field study plot or the use of 14C radiolabeled materials in support of study project work performed within this area was terminated on June 29, 2007. We have initiated the process for final decommission of the designated radioactive field study area and anticipate completing this work at some point during the current calendar year. Upon the successful completion and documentation of the final decommission of this designated field study plot referred to as the Stine Farm 14C Field Test Plot, we intend to petition through amendment to the License (07-13441-02) for the termination of any future purposed conditional use of licensed materials within this designated area plot.

1.3 Site Details

The Field Test Plot (FTP) is a fenced plot of land with research farms and plots to the north, east, and west, and a wooded area to the south. All of the surrounding land is owned and controlled by Dupont.

The FTP includes a radioactive material use area (38' by 130'), and 2 areas where there was no-use of 14C: a mounded area with two types of lysimeters installed that were never

used with radioactive material (62' x 77'), and an unused area (53' x 62').



Close up

Imagery ©2017 U.S. Geological Survey, Map data ©2017 Google

Procedures for Dupont limited annual activity to 10 mCi per year for the 20 year period of use. Under this restriction, the potential total activity was 200 mCi.

The HSA states that the methodology of use for 14C at the FTP was to build a ground level barrier or subplot, and encase the plants with plastic to ensure that the 14C solution was only applied to the immediate area containing plant (See pictures in the HSA, page 15).

At the termination of each study, all remaining target vegetation specimens and any remaining invasive vegetative growth appearing within the plot were collected, bagged, and removed from the delineated subplot as specimens for the study, or as radioactive waste. Representative soil core samples were taken from the interior of the subplot as well as the exterior of the subplot area. Typically, 6 to 8 soil core samples were extracted, 1 inch in diameter and approximately 12 to 18 inches in depth. Core samples were analyzed to provide soil concentrations and levels of 14C radioisotope present. If an elevated soil sample was found, the surrounding soil was removed and sent for disposal as radioactive waste. A test subplot was considered ready for reuse based upon the resultant assay levels as close to background as possible.

2.0 SURVEY APPROACH

2.1 Data Quality Objectives (DQO)

This Scoping Survey was designed with consideration of the guidance provided by the Nuclear Regulatory Commission (NRC) regarding Radiological Scoping Surveys. In particular the guidance provided by the NRC in NUREG 1757 (Consolidated Decommissioning Guidance).

The following Data Quality Objectives were used to develop an acceptance criteria and support the goals of the Scoping Survey.

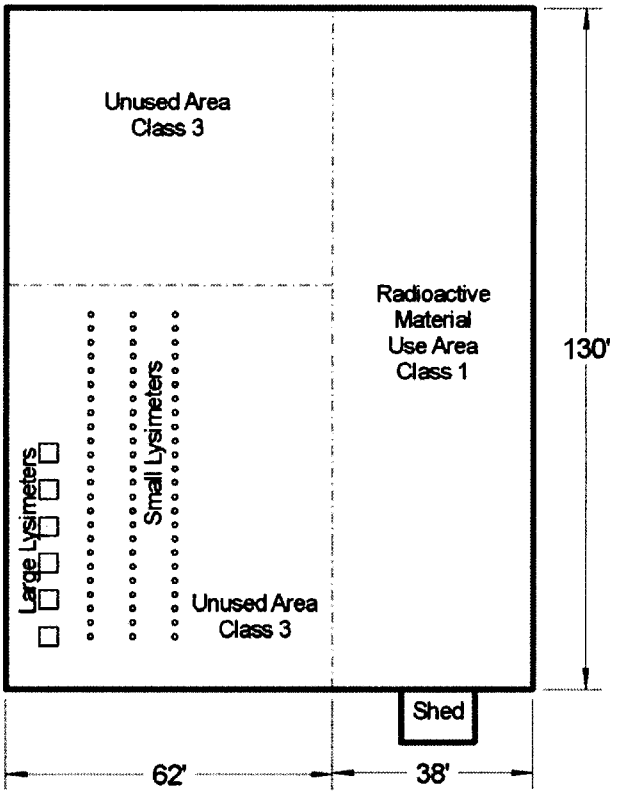
1. State the problem.
    a. The FTP was used for studies using 14C, a radioactive material. No data exists to assist in the decision making process to evaluate the hazard, or deem the site safe for unrestricted use.
2. Identify the goal of the study.
    a. Data will need to be generated to evaluate the areas that had known use of 14C, and to compare the activity concentration to a DCGL. Areas adjacent, or within the boundaries of the FTP that had no use of 14C, will need data to support the claim.
3. Identify the information inputs.
    a. The attached Historical Site Assessment
    b. 14C Soil Sample Analysis from an accredited laboratory, including pertinent background information.
    c. Other data collection for lysimeters that do not have soil.
4. Define the boundaries of the study.
    a. This study will stay within the fenced boundary of the FTP, except for background sample locations.
    b. This study will focus on 14C only, as it is historically the only isotope used at the FTP.
5. Develop an analytical approach.
    a. Soil samples will be taken to show the concentrations of 14C.
    b. The number of samples and locations will follow MARSSIM Chapter 5, for a class 1 survey of the active zones of the site.
6. Specify the performance or acceptance criteria.
    a. A quoted DCGL from NUREG 1757, Volume 1, Appendix B, Screening Values will be used to compare the soil concentrations of the samples.
7. Develop the plan for obtaining data.
    a. The following sections will describe the plan for obtaining data, as well as the methods for measurement.

2.2 Survey Design Basis

The following assumptions were used to design this survey:

- The RAM use area was considered a Class 1 survey unit, and all other areas Class 3.

Map with Survey Class Areas



- The HSA states that radioactive materials were not used in any of the lysimeters. This area, including the lysimeters was also considered a Class 3 area.
- 14C DCGL: 12 pCi/g from NUREG 1757, Volume 1, Appendix B, Screening Values
- σ: 1 pCi/g
- MDA: 1 pCi/g quoted from ESC Lab Sciences
- Lower Bound of the Gray Region (LBGR): 6 pCi/g
- (DCGL-LBGR)/σ = The Relative Shift = 6
- The southwestern corner was considered the coordinate origin, with the shed is on the x-axis, and the y-axis perpendicular.

Using the assumptions above, the relative shift of 6, and using table 5.3 from MARSSIM, 9 sample locations should be used for this Class 1 area. An extra 20% was added to make 11 locations in the area where radioactive materials were used.

The surveyor's discretion was used for sample number and the method of choosing locations in the Class 3 area.

This methodology produced 22 sample locations. They include:

- 4 Background locations outside the plot randomly selected and shown on the survey map. The area on the south side of the FTP was excluded, because it is a lower elevation than the FTP.
- 11 soil sample locations in the Class 1 impacted area; coordinates chosen using a random start point and a MARSSIM triangular grid. The random start point was (97' x 43'; sample #12) and the grid spacing was calculated to be L =24', and 0.866L = 21'.
- 5 soil sample locations of the non-impacted area; coordinates randomly chosen using the Microsoft excel Rand() function
- 1 composite surface soil sample for the six large square lysimeters;
- Small round lysimeters
    - There are 72 small lysimeters in 3 columns. The lysimeters were in varying states, with some still full of soil, some covered and empty, and some uncovered with rain water inside. Three lysimeters were randomly chosen from each column for sampling (total of 9). The lysimeters were labeled with A, B, C for columns, and 1-24 for the rows (See Survey Map in Appendix B).

Column	Number	Status	Sample Method
A	2	Empty	Wipe
A	10	Soil	Composite Surface Soil
A	17	Soil	Composite Surface Soil
B	16	Soil	Composite Surface Soil
B	20	Soil	Composite Surface Soil
B	22	Soil	Composite Surface Soil
C	6	Empty	Wipe
C	9	Empty	Wipe
C	11	Water	Swab in water; LSC

3.0 SURVEY METHODS

3.1 Survey Method

Soil samples

Since the Dupont routine samples were taken at depths up to 18", it was determined that if there was remaining 14C contamination, it would likely be at the surface (if there was a spill),

or at a depth >18". To be comprehensive, the sampling procedure would need to test for contamination at multiple depths.

Soil samples were collected at three depths: 0-6", 12"-18", and 24"-30" at each location using a 2" hand auger. The sampling procedure was as follows:

- Auger the first 6"
- Collect the sample into a sealable bag
- Replace covers on all sample collection pans
- Wipe down the auger, and any tools used in collection
- Remove the soil from 6"-12" at the same location, do not collect for analysis
- Wipe down the auger
- Auger 12"-18"
- Collect the sample into a sealable bag
- Replace covers on all sample collection pans
- Wipe down the auger, and any tools used in collection
- Remove 18"-24" at the same location, do not collect for analysis
- Wipe down the auger
- Auger 24"-30"
- Collect the sample into a sealable bag
- Replace covers on all sample collection pans
- Wipe down the auger, and any tools used in collection
- Remove 18"-24" at the same location, do not collect for analysis
- Wipe down the auger
- Move to the next location and repeat the process

Lysimeters

Th HSA states that radioactive materials were not used in any of the lysimeters. This area including the lysimeters was considered a Class 3 area. Samples were taken for confirmation purposes only.

A 2" deep by 2" diameter soil sample was taken from the surface of each of the large lysimeters (shown on the survey map). The samples were composited for analysis, since it was not expected that any radioactive material was ever used with the lysimeters.

Nine random small lysimeters were chosen for sampling. Three of the lysimeters were empty, and a wipe test was performed, five of the lysimeters were dirt filled and a 2"deep by 2" diameter sample was taken for soil analysis, and the final was full of water. A swab was dipped in the water and put through a LSC for analysis. While the swab would not give an accurate activity for the water, it would be an indicator that radioactive materials were present in the lysimeter.

Exposure rates were measured, at waist level, using a Victoreen 450P survey meter (internal pressurized ion chamber) in all of the areas surveyed.

Quality Assurance

The Survey meter used to measure exposure rates had been calibrated within 12 months using radioactive standards traceable to NIST. Also, a source check was completed at the beginning of the survey.

All soil samples were sent to ESC Laboratory Sciences (ESC) for analysis. ESC performs radiochemical analysis and analytical services for soil in accordance with the requirements of the Federal, State and National Environmental Laboratory Accreditation Program (NELAP) programs. The QC report is included with the sample analysis in Appendix B.

3.2 Survey Personnel and Resources

Personnel Qualifications

All personnel had levels of training and experience commensurate with their assigned tasks. For those individuals involved in taking radiological measurements and samples, special instruction was provided when necessary on equipment, special techniques, and practices relating to survey activities.

4.0 SURVEY RESULTS

4.1 Results

All soil samples, including the Class 1 area, Class 3 area, and lysimeters were below the assumed DCGL of 12 pCi/g from NUREG 1757, Volume 1, Appendix B, Screening Values.

The small lysimeter wipe samples, and single rain water swab were all comparable to background.

The exposure rates measured in various areas of the FTP were consistent with normal background. The typical background exposure rates in and near the FTP ranged from 10 to 20 μR/h as measured in unaffected fields. Exposure rates were comparable to background of 10 μR/h.

Soil Sample Summary

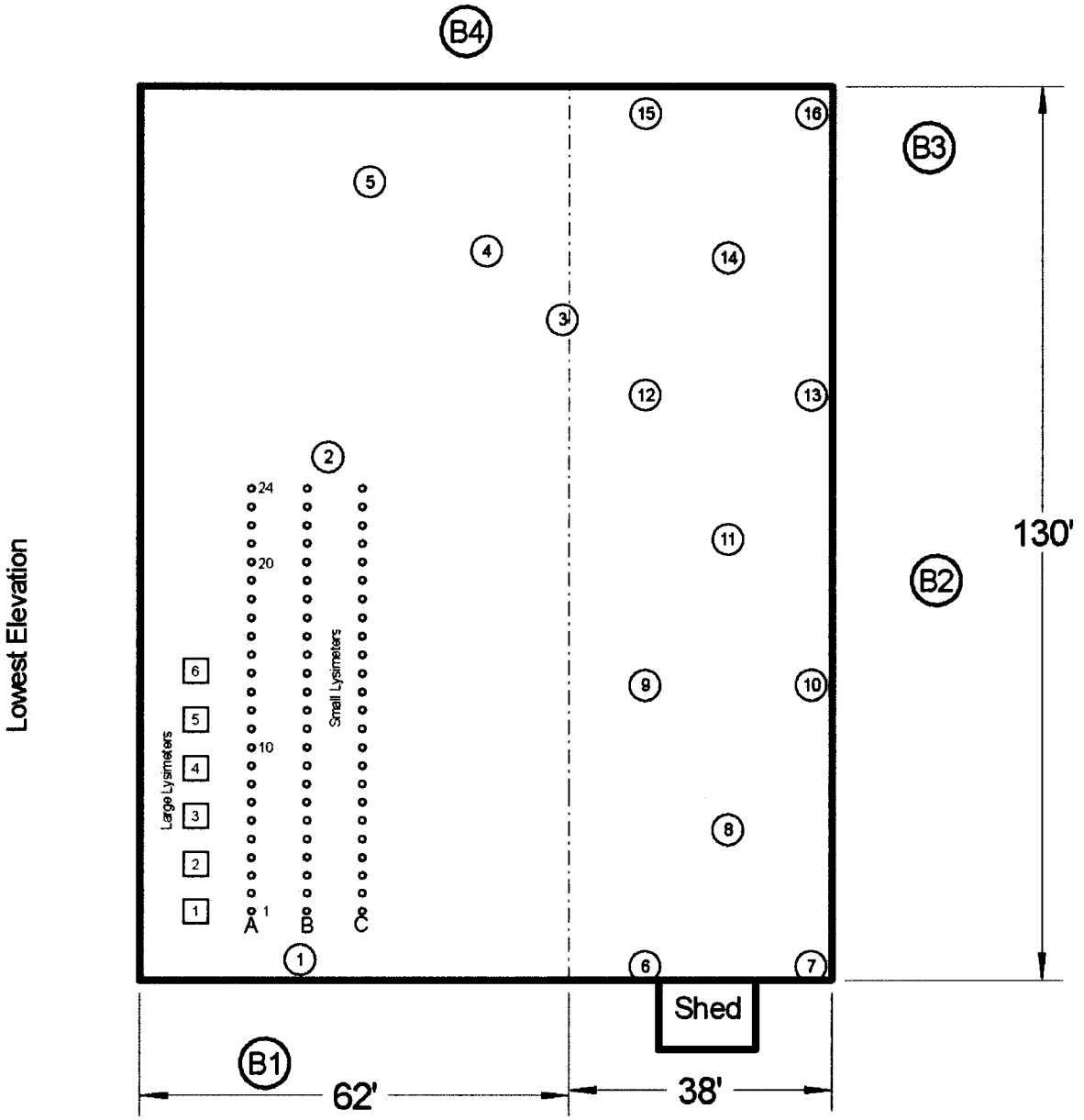
Area	Minimum (pCi/g)	Maximum (pCi/g)	Average (pCi/g)	Standard Deviation pCi/g
Background	-0.582	1.300	0.158	0.527
Class 1 Soil Samples, Gross	-0.558	6.830	0.463	1.380
Class 3 Soil Samples, Gross	-0.291	2.650	0.479	0.807

Soil Sample Analysis Results

Sample ID	Grid Location (x,y) in ft		Analysis	Result	Error	Units	DL
B1 A	Not Gridded, See Map		Carbon-14	-0.097	0.271	pCi/g	0.463
B1 B	Not Gridded, See Map		Carbon-14	0.127	0.341	pCi/g	0.561
B1 C	Not Gridded, See Map		Carbon-14	-0.28	0.285	pCi/g	0.505
B2 A	Not Gridded, See Map		Carbon-14	-0.287	0.335	pCi/g	0.587
B2 B	Not Gridded, See Map		Carbon-14	0.844	0.383	pCi/g	0.568
B2 C	Not Gridded, See Map		Carbon-14	1.3	0.381	pCi/g	0.532
B3 A	Not Gridded, See Map		Carbon-14	0.393	0.321	pCi/g	0.506
B3 B	Not Gridded, See Map		Carbon-14	0.456	0.271	pCi/g	0.414
B3 C	Not Gridded, See Map		Carbon-14	-0.16	0.253	pCi/g	0.442
B4 A	Not Gridded, See Map		Carbon-14	-0.582	0.404	pCi/g	0.722
B4 B	Not Gridded, See Map		Carbon-14	0.191	0.357	pCi/g	0.585
B4 C	Not Gridded, See Map		Carbon-14	-0.009	0.351	pCi/g	0.59
Sample 1 A	23	3	Carbon-14	-0.267	0.415	pCi/g	0.719
Sample 1 B	23	3	Carbon-14	1.06	0.449	pCi/g	0.683
Sample 1 C	23	3	Carbon-14	-0.053	0.178	pCi/g	0.303
Sample 2 A	27	76	Carbon-14	0.192	0.187	pCi/g	0.299
Sample 2 B	27	76	Carbon-14	0.139	0.303	pCi/g	0.495
Sample 2 C	27	76	Carbon-14	0.065	0.323	pCi/g	0.536
Sample 3 A	62	96	Carbon-14	2.65	0.418	pCi/g	0.502
Sample 3 B	62	96	Carbon-14	0.737	0.3	pCi/g	0.439
Sample 3 C	62	96	Carbon-14	-0.111	0.331	pCi/g	0.565
Sample 4 A	50	106	Carbon-14	1.45	0.292	pCi/g	0.368
Sample 4 B	50	106	Carbon-14	-0.036	0.328	pCi/g	0.554
Sample 4 C	50	106	Carbon-14	1.05	0.431	pCi/g	0.632
Sample 5 A	33	116	Carbon-14	0.65	0.343	pCi/g	0.52
Sample 5 B	33	116	Carbon-14	-0.291	0.227	pCi/g	0.406
Sample 5 C	33	116	Carbon-14	-0.057	0.283	pCi/g	0.48
Sample 6 A	97	1	Carbon-14	-0.011	0.355	pCi/g	0.597
Sample 6 B	97	1	Carbon-14	0.065	0.361	pCi/g	0.601
Sample 6 C	97	1	Carbon-14	0.294	0.348	pCi/g	0.563
Sample 7 A	73	1	Carbon-14	0.101	0.321	pCi/g	0.531
Sample 7 B	73	1	Carbon-14	0	0.34	pCi/g	0.571
Sample 7 C	73	1	Carbon-14	0.298	0.334	pCi/g	0.537
Sample 8 A	85	22	Carbon-14	-0.01	0.117	pCi/g	0.196
Sample 8 B	85	22	Carbon-14	0.067	0.233	pCi/g	0.385
Sample 8 C	85	22	Carbon-14	0.01	0.132	pCi/g	0.22

Sample 9 A	97	43	Carbon-14	6.83	0.561	pCi/g	0.475
Sample 9 B	97	43	Carbon-14	4.23	0.439	pCi/g	0.468
Sample 9 C	97	43	Carbon-14	0.501	0.225	pCi/g	0.334
Sample 10 A	73	43	Carbon-14	-0.046	0.318	pCi/g	0.537
Sample 10 B	73	43	Carbon-14	0.686	0.404	pCi/g	0.63
Sample 10 C	73	43	Carbon-14	0.128	0.239	pCi/g	0.392
Sample 11 A	85	64	Carbon-14	0.703	0.295	pCi/g	0.443
Sample 11 B	85	64	Carbon-14	-0.07	0.383	pCi/g	0.648
Sample 11 C	85	64	Carbon-14	0.135	0.268	pCi/g	0.441
Sample 12 A, Start Point	97	85	Carbon-14	-0.046	0.129	pCi/g	0.22
Sample 12 B, Start Point	97	85	Carbon-14	-0.018	0.17	pCi/g	0.287
Sample 12 C, Start Point	97	85	Carbon-14	0.485	0.171	pCi/g	0.241
Sample 13 A	73	85	Carbon-14	0.201	0.159	pCi/g	0.251
Sample 13 B	73	85	Carbon-14	-0.558	0.19	pCi/g	0.373
Sample 13 C	73	85	Carbon-14	0.772	0.291	pCi/g	0.42
Sample 14 A	85	105	Carbon-14	-0.05	0.248	pCi/g	0.42
Sample 14 B	85	105	Carbon-14	-0.382	0.304	pCi/g	0.544
Sample 14 C	85	105	Carbon-14	0.006	0.211	pCi/g	0.353
Sample 15 A	97	126	Carbon-14	-0.124	0.213	pCi/g	0.368
Sample 15 B	97	126	Carbon-14	0.474	0.262	pCi/g	0.401
Sample 15 C	97	126	Carbon-14	0.433	0.225	pCi/g	0.339
Sample 16 A	73	126	Carbon-14	-0.348	0.292	pCi/g	0.52
Sample 16 B	73	126	Carbon-14	0.145	0.17	pCi/g	0.271
Sample 16 C	73	126	Carbon-14	0.383	0.285	pCi/g	0.452
Small Lysimeter	Not Gridded		Carbon-14	-0.224	0.252	pCi/g	0.439
Large Lysimeter	Not Gridded		Carbon-14	0.296	0.192	pCi/g	0.299

Area Map


B4
B3
B2
B1
130'
62'
38'
Shed
Lowest Elevation
Large Lysimeters
Small Lysimeters
A
B
C
1
2
3
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Exposure Rates, Wipe Tests, Sample Coordinates

Area Survey Results			Wipe Tests	Dose Rate	
Sample Number	Surface/Description	Location (x, y)	14C (dpm/100 cm^2)	Survey Meter #	Gross (μrem/hr)
B1	Background Soil	See Map	N/A	*1*	12
B2	Background Soil	See Map	N/A	*1*	12
B3	Background Soil	See Map	N/A	*1*	12
B4	Background Soil	See Map	N/A	*1*	12
1	Soil Sample	23, 3	N/A	*1*	12
2	Soil Sample	27, 76	N/A	*1*	12
3	Soil Sample	62, 96	N/A	*1*	12
4	Soil Sample	50, 106	N/A	*1*	12
5	Soil Sample	33, 116	N/A	*1*	12
6	Soil Sample	97, 1	N/A	*1*	12
7	Soil Sample	73, 1	N/A	*1*	12
8	Soil Sample	85, 22	N/A	*1*	12
9	Soil Sample	97, 43	N/A	*1*	12
10	Soil Sample	73, 43	N/A	*1*	12
11	Soil Sample	85, 64	N/A	*1*	12
12	Soil Sample	97, 85	N/A	*1*	12
13	Soil Sample	73, 85	N/A	*1*	12
14	Soil Sample	85, 105	N/A	*1*	12
15	Soil Sample	97, 126	N/A	*1*	12
16	Soil Sample	73, 126	N/A	*1*	12
LI1	Soil Sample	Large Lysimeter; 1	N/A	*1*	12
LI2	Soil Sample	Large Lysimeter; 2	N/A	*1*	12
LI3	Soil Sample	Large Lysimeter; 3	N/A	*1*	12
LI4	Soil Sample	Large Lysimeter; 4	N/A	*1*	12
LI5	Soil Sample	Large Lysimeter; 5	N/A	*1*	12
LI6	Soil Sample	Large Lysimeter; 6	N/A	*1*	12
SI1	Wipe Test	Small Lysimeter; A2	-4	*1*	12
SI2	Soil Sample	Small Lysimeter; A10	N/A	*1*	12
SI3	Soil Sample	Small Lysimeter; A16	N/A	*1*	12
SI4	Soil Sample	Small Lysimeter; B20	N/A	*1*	12
SI5	Soil Sample	Small Lysimeter; B22	N/A	*1*	12
SI6	Soil Sample	Small Lysimeter; B16	N/A	*1*	12
SI7	Wipe Test	Small Lysimeter; C6	-3	*1*	12
SI8	Wipe Test	Small Lysimeter; C11	-3	*1*	12
SI9	Water Swab	Small Lysimeter; C9	-2	*1*	12

5.0 CONCLUSIONS

The radiological survey of the areas at the Field Test Plot demonstrates that the 14C concentration in the soil is less than the assumed $DCGL_w$ (25 mrem/yr) of 12 pCi/g. The number of samples locations in the Class 1 survey area was 20% more than required for a Final Status Survey, and the soil at each location was analyzed at three depths. No statistical tests are required to reject the null hypothesis, and prove that the remaining radioactivity in the Field Test Plot is below the limit for unrestricted use. This Scoping Survey should be used as a Final Status Survey; and since the 14C Field Test Plot has met the requirements of 10 CFR 20 for unrestricted use, the site should be removed from the current Dupont NRC license.

6.0 REFERENCES

6.1 USNRC, Regulatory Guide 1.86., Termination of Operating Licenses for Nuclear Reactors, June 1974.

6.2 USNRC, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unaffected Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material", May 1987.

6.3 NUREG 1757, USNRC, "Decommissioning Process for Materials Licensees", Final September 2003.

6.4 NUREG-1575, EPA 402-R-97-016, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM): Final, August 2000.

7.0 ATTACHMENTS

Attachment A	Historical Site Assessment
Attachment B	Soil Sample Analysis Report, From ESC
Attachment C	Liquid Scintillation Counter Results
Attachment D	Survey Meter Calibrations

Attachment A

Historical Site Assessment

The Stine Farm 14C Field Test Plot Historical Site Assessment (HSA)

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Environmental Compliance SHE Consultant
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1. Executive Summary

E.I. du Pont de Nemours and Company, Inc. (DuPont), operating under the conditions of the current DuPont - US NRC Radioactive Material License Number 07-13441-02, intends to decommission for future unrestricted use, the designated radioactive field study plot of the Stine Farm located within the Stine-Haskell Research Center (SHRC). This identified small field plot area was managed and controlled over the course of approximately twenty years as designated by the Radiation Safety Committee and Radiation Safety Program for the use of low level tracer byproduct materials (^{14}C radiolabeled agricultural chemicals only) in support of metabolism, stability, and environmental fate studies related to agricultural chemicals and their associated products.

It is the intent of the DuPont Radiation Safety program, to remove this designated area of prior tracer field study activities from NRC approved research purposes for which this location actively used low levels of licensed materials under the current License. All active licensed material use related to this designated area was ceased approximately one decade ago and the last recorded date of active use of these radioactive materials to the field study plot or the use of ^{14}C radiolabeled materials in support of study project work performed within this area was terminated on June 29, 2007. We have initiated the process for final decommission of the designated radioactive field study area and anticipate completing this work at some point during the current calendar year. Upon the successful completion and documentation of the final decommission of this designated field study plot referred to as the Stine Farm ^{14}C Field Test Plot, we intend to petition through amendment to the License (07-13441-02) for the termination of any future purposed conditional use of licensed materials within this designated area plot.

2. Purpose

The purpose of this document is to describe the background of the Stine Farm ^{14}C Field Test Plot and to provide an overview of prior field study activities on the Site and to assist in defining the scope of radiological work required for planning, performing, and assessing the surface soil final status of the Site using radiological surveys that meet established dose or risk based release criteria. These radiological surveys and assessments will be completed in adherence to the guidance provided in the *NUREG 1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*. This work will be conducted in a manner that demonstrates compliance with occupational, public and environmental radiation protection regulations, the requirements established by and within the jurisdiction of federal, state, and local authorities, and in accordance with all DuPont Corporate Environmental and Safety Guidance standards, protocols, and policies. This work will include but is not restricted to;

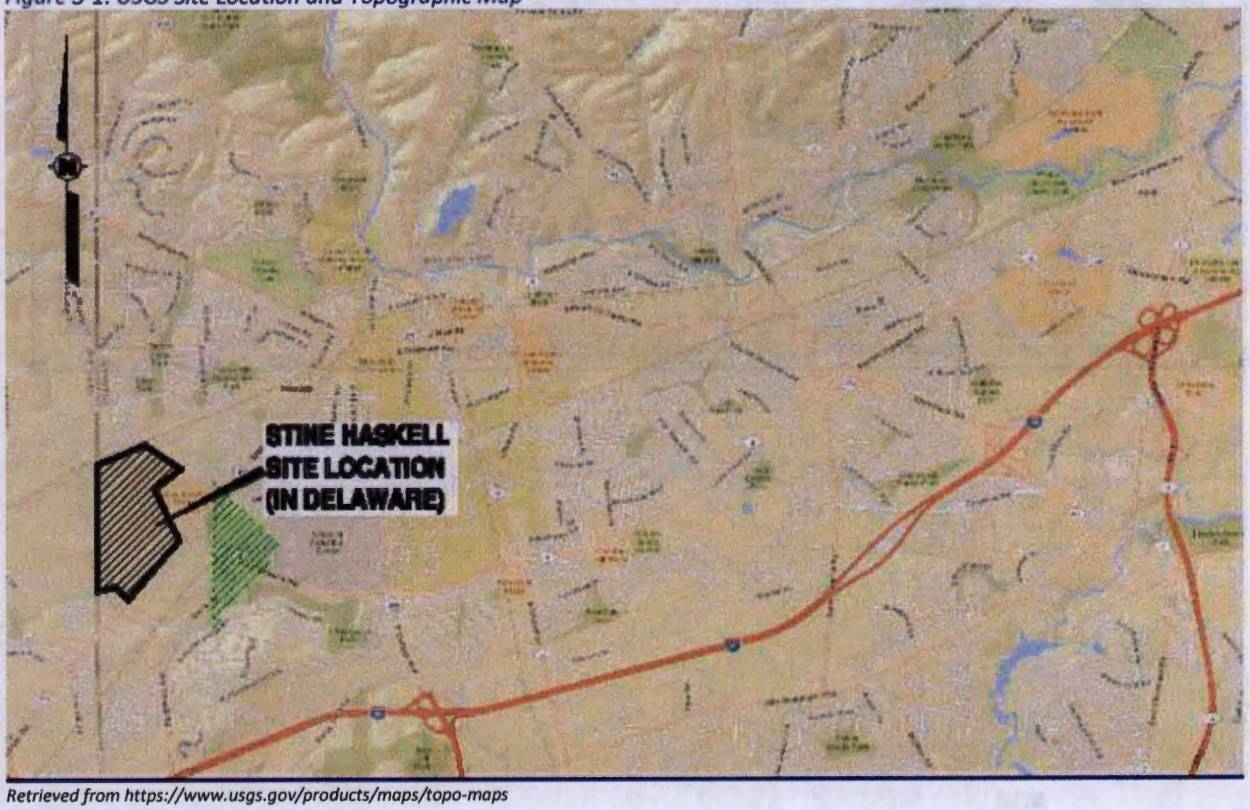
- A report of the results of scoping surveys within and around the Stine Farm ^{14}C Field Test Plot and any remediation activities related to this work,
- Documentation for the proper disposal of any radioactive waste generated from this work and area,
- A report of the results of the Final Radiological Status Survey, and
- A demonstration of all utilization areas within the designated Stine Farm 14C Field Test Plot that meet the criterion for unrestricted release under the MARSSIM methods.

3. Facility Description

3.1 Physical Characteristics

The DuPont Stine-Haskell Research Center (Site) is located at 1090 Elkton Road (Route 2) in Newark, Delaware, 19711. SHRC is located at approximately 39 degrees and 40 minutes north latitude and 75 degrees and 45 minutes west longitude. The Site consists of offices, laboratories, greenhouses and facilities in a campus-like setting with agricultural fields on approximately 535 acres. The property is topographically flat (around 120 feet mean sea level (MSL) but rising to the west to an elevation of 170 MSL) and is bordered by woodlands to the west, north and east (See ***Figure 3-1: USGS Site Location and Topographic Map***). There are also railroad tracks bordering the Site to the north, two homes to the east, and a light industrial park to the south (along Route 2). Approximately half the Site is in the State of Maryland (agricultural fields) and half in the State of Delaware (mostly offices, labs, greenhouses, the Powerhouse and landscaped areas). The location of the closest off-site human dwelling is approximately 597ft away from the field test plot.

Figure 3-1: USGS Site Location and Topographic Map



Retrieved from https://www.usgs.gov/products/maps/topo-maps

The Stine Farm ^{14}C Field Test Plot is located within the boundary of the State of Delaware (See red box on ***Figure 3-2: DuPont Stine-Haskell Research Center (Site) and 14C Field Test Plot*** and ***Figure 3-3: DuPont Stine-Haskell Research Center (Site), 14C Field Test Plot, and DE State Border***). The plot is enclosed by a 4ft high wire mesh fence that measures 130ft (in the east to west direction) x 100ft (in the north to south direction) (***Figure 3-4: Stine Farm 14C Field Test Plot Schematic***).

Figure 3-2: DuPont Stine-Haskell Research Center (Site) and 14C Field Test Plot

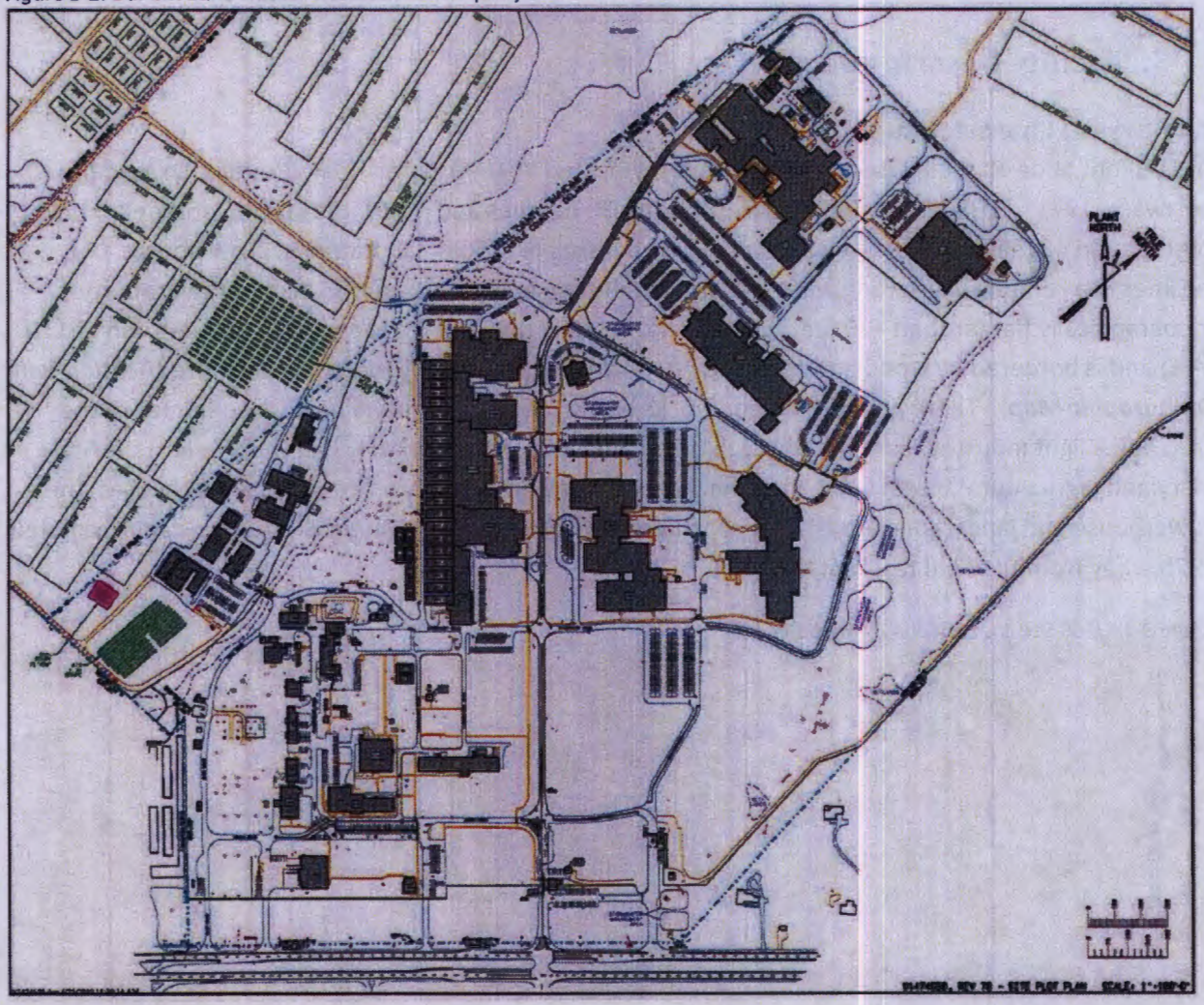


Figure 3-3: DuPont Stine-Haskell Research Center (Site), 14C Field Test Plot, and DE State Border

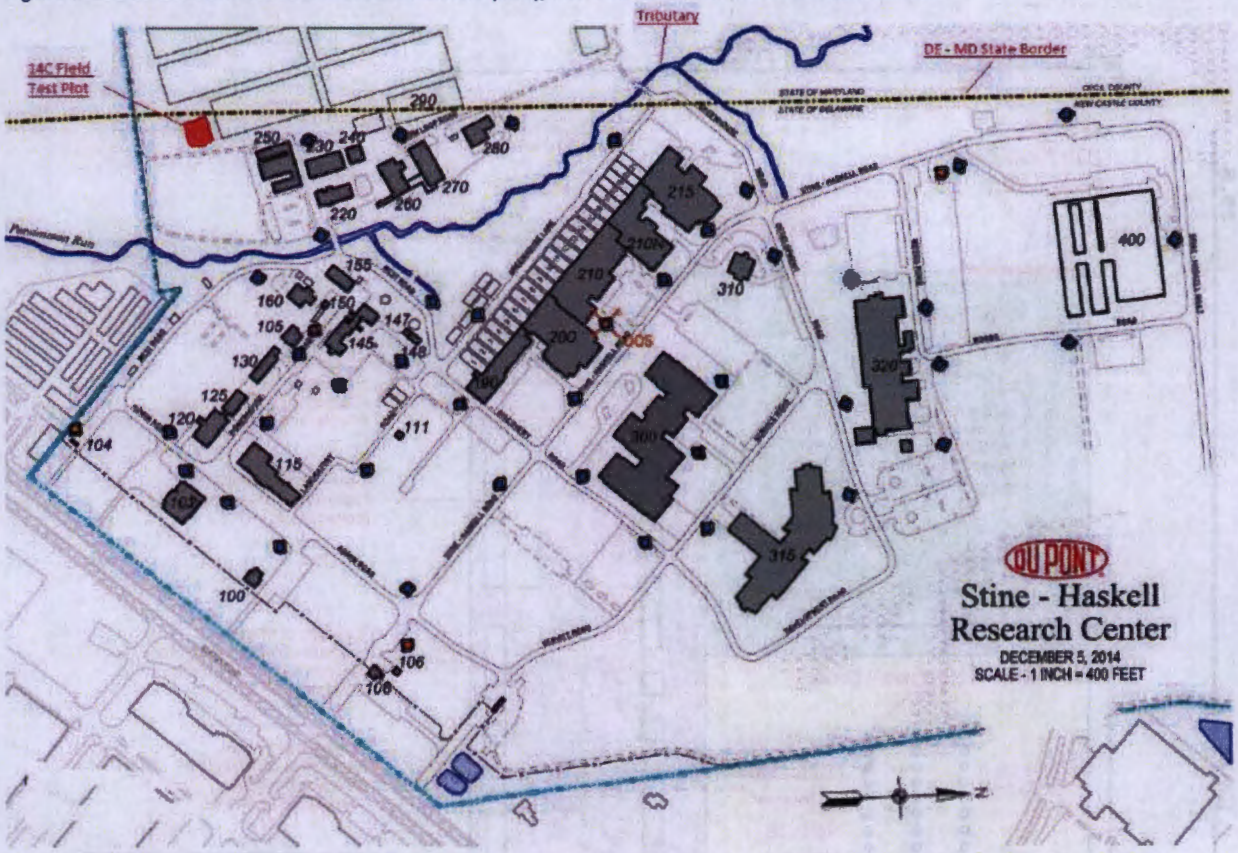


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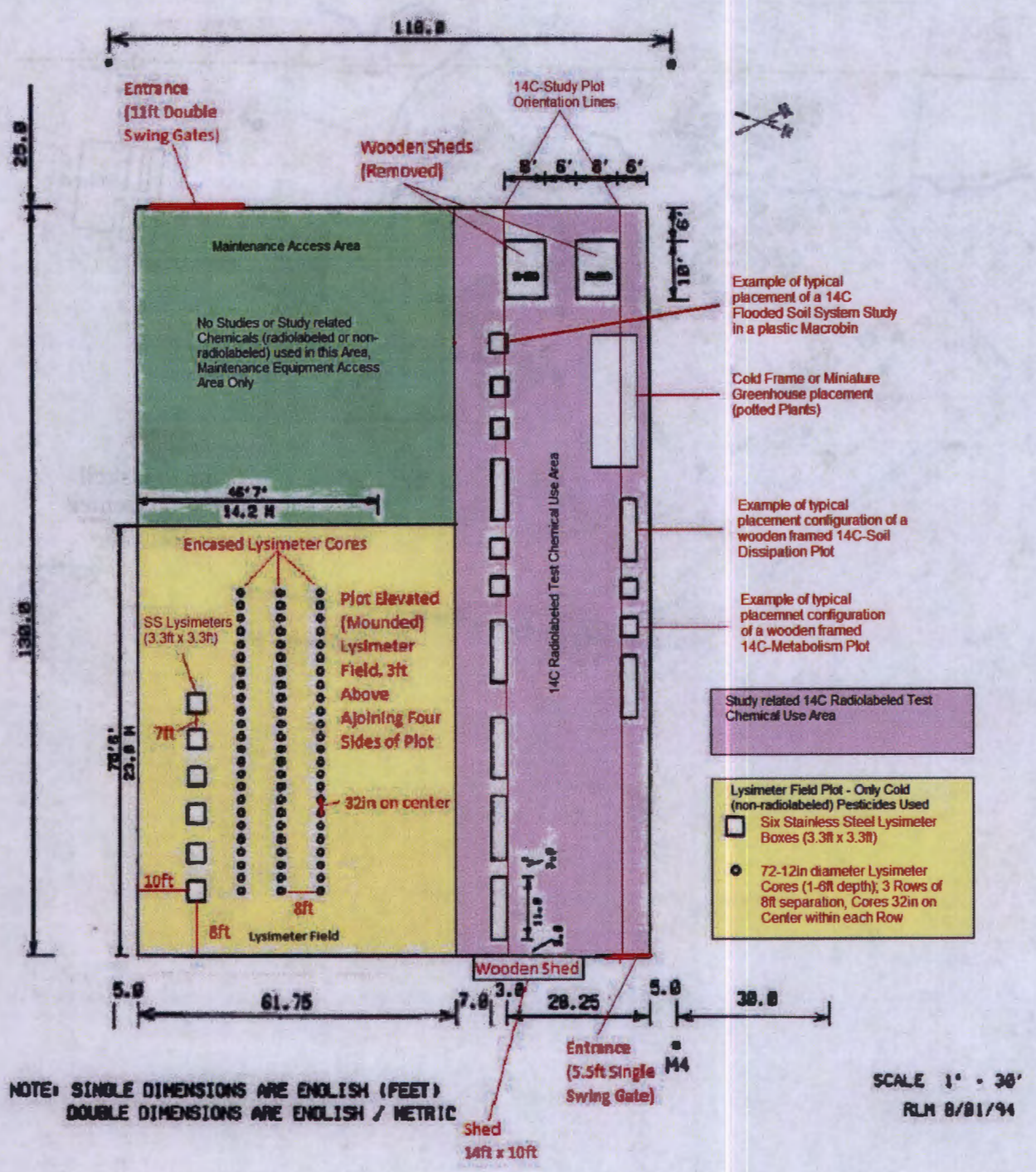
Figure 3-4: Stine Farm 14C Field Test Plot Schematic

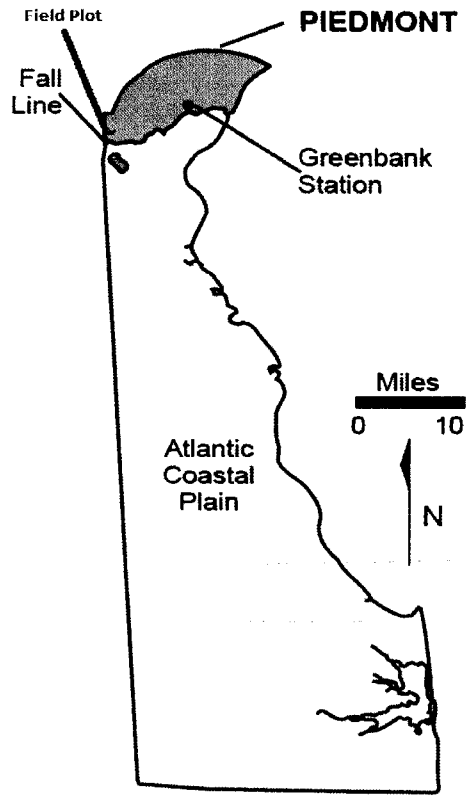


3.2 Environmental Setting

New Castle County Delaware encompasses portions of two regional geological provinces: the Appalachian Piedmont and the Atlantic Coastal Plain. Physiographically the border of the Piedmont with

the Coastal Plain Province is marked by the Fall Zone (***Figure 3-5: Regional Geological Provinces***). The SHRC is within the Fall Zone. The Coastal Plain sediments within the area of the Site are the Holocene (Recent age), Columbia Formation (Pleistocene age) and Potomac Formation (Early and Late Cretaceous age). They overlie the crystalline rocks of the Piedmont province, predominantly gneisses and schists of the Wissahickon Formation with some layered amphibolites. These crystalline rocks are part of the Wilmington Complex (Ward, 1959). Based on 1991 boring logs for SHRC site monitoring wells by Groundwater Technology Incorporated, the weathered bedrock has been encountered within 10 to 20 feet of the ground surface. The descriptions indicate the weathered bedrock is orange to brown with mica and black minerals; this is frequently indicative of weathered Wissahickon Formation.

Figure 3-5: Regional Geological Provinces



The uppermost layers of soil on the Stine Farm ^{14}C Field Test Plot's geographically associated soil complex is described here using the United States Department of Agriculture's, Web Soil Survey Database. The Stine Farm ^{14}C Field Test Plot is defined as encompassing part of the Mattapex-Urban Land Soil Complex or MuB (See ***Figure 3-6; Geographically Associated Soil Complex-Mattapex-Urban Land Complex (MuB)***).

Figure 3-6; Geographically Associated Soil Complex-Mattapex-Urban Land Complex (MuB)

https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

The following describes the Stine Farm ^{14}C Field Test Plot soil profile represented in the MuB—Mattapex-Urban land complex;

New Castle County, Delaware (Retrieved from: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx)
MuB—Mattapex-Urban land complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2p7h0
Elevation: 0 to 260 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Mattapex and similar soils: 50 percent
Urban land: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mattapex

Setting

Landform: Flats, depressions, swales

Landform position (three-dimensional): Rise
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Silty eolian deposits over fluviomarine sediments

Typical profile

Ap - 0 to 11 inches: silt loam
BE - 11 to 15 inches: silt loam
Bt - 15 to 36 inches: silt loam
2C1 - 36 to 60 inches: fine sandy loam
2C2 - 60 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 20 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Flats
Down-slope shape: Linear
Across-slope shape: Linear

Minor Components

Udorthents, loamy

Percent of map unit: 10 percent
Landform: Knolls, flats
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Weather averages for the immediate area Newark, DE – 19711 can be seen in the Climate data for Newark University Farm, Longitude: 075°44'00W, Latitude: 39°40'00N, Elevation: 90' (NOAA Station located within a three-mile radius of the Stine Farm ^{14}C Field Test Plot). Average weather Newark, DE, 19711: 1981-2010 normals are shown in ***Figure 3-7: Newark, DE weather averages (NOAA Station Id: DE076410)***

Figure 3-7: Newark, DE weather averages (NOAA Station Id: DE076410)

Annual high temperature:	66.6°F
Annual low temperature:	44.4°F
Average temperature:	55.5°F
Average annual precipitation - rainfall:	46.17 inch
Av. annual snowfall:	8 inch

Regional surface drainage patterns are controlled by the Delaware River. More locally the SHRC Site lies within the drainage basin of the Christina River. Site surface drainage patterns are controlled by an unnamed tributary of the west branch of the Christina River, which bisects the Site and flows in a southerly direction, connecting with the West branch south of the property boundary. This tributary approximates the State line, with the agricultural fields located to the west (in Maryland) and the remainder of the Site located to the east in Delaware. ***Figure 3-3: DuPont Stine-Haskell Research Center (Site), 14C Field Test Plot, and DE State Border*** shows the Delaware portion of the Site.

The plot fence line or border of the Stine Farm ^{14}C Field Test Plot lies at a distance no closer than approximately 398ft from this unnamed tributary (See ***Figure 3-8: Stine Farm 14C Field Test Plot Relative Locational Distances***).

Figure 3-8: Stine Farm 14C Field Test Plot Relative Locational Distances

Retrieved from: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

Shallow groundwater at the SHRC Site occurs under unconfined (water-table) conditions and ranges in depth from 3 to 23 feet below grade. Groundwater movement at the Site is generally south and

southwest across the Site, partially discharging to the unnamed tributary to the West Branch of the Christina River and providing base flow to that surface drainage feature. In the southern portion of the property, along Elkton Road, groundwater exits the Site as subsurface flow. Results of previous Site aquifer single borehole conductivity testing (i.e. "Slug Testing") demonstrate low hydraulic conductivity; on the order of 1x10-4 cm/sec to 1x10-5 cm/sec in the near-surface geologic materials in the upper portion of the water-table.

Delaware Department of Natural Resources and Environmental Control (DNREC) established a Groundwater Management Zone (GMZ) on this site in April, 1997. This was accomplished by a Memorandum of Agreement (MOA) between the Division of Air and Waste Management and the Division of Water Resources. The GMZ is effective in preventing any well permits from being issued by DNREC in the specific area covered by the GMZ; this means no wells can be drilled in the area to withdraw groundwater. The vicinity of the Site is serviced by a public water company, so there is no human exposure to the groundwater within this immediate area.

4. Historical Site Assessment

4.1 Approach and Rationale

The Historical Site Assessment (HSA) for the Stine Farm 14C Field Test Plot is a review of the historical Research and Development (R&D) activities at this field laboratory facility and plot. This investigation and evaluation will support field plot decommissioning activities under the current License at this Site. The HSA approach collected, organized and evaluated information that described the R&D activities at the Stine Farm 14C Field Test Plot in terms of physical configuration and the extent to which radiolabeled materials were used in association with field studies that were performed on this Site. The results of the ongoing investigations into the extent of any potential contamination will drive remediation and/or mitigation efforts as appropriate.

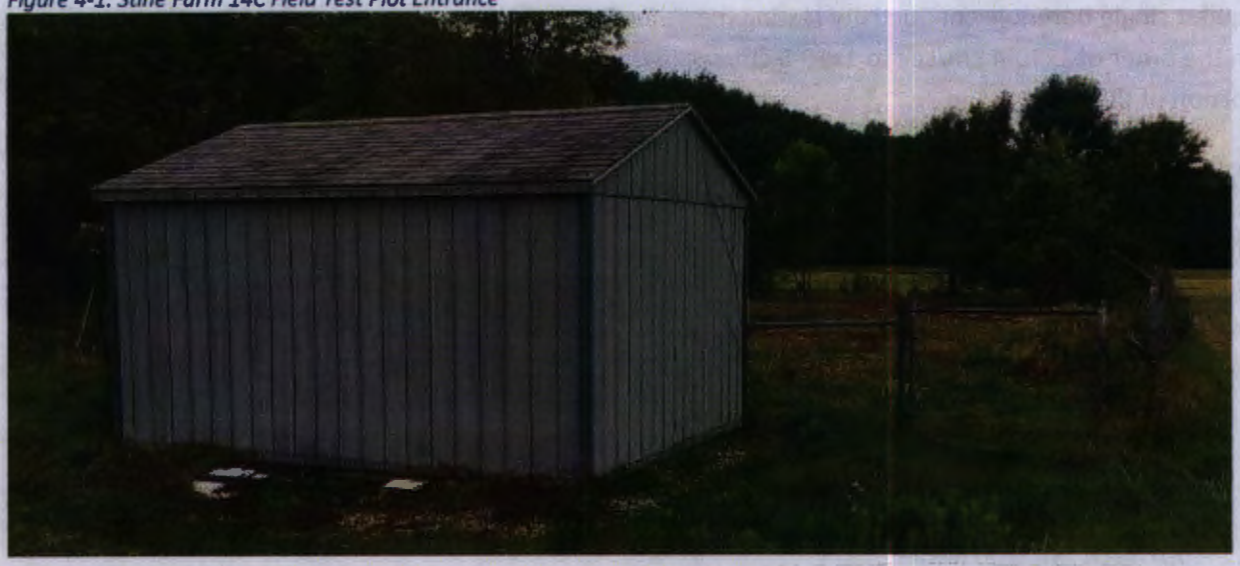
Radiological tests for metabolism, stability, and environmental fate studies of agricultural chemicals and their associated products were conducted in small bordered and controlled subplots within the enclosed area of the Stine Farm 14C Field Test Plot. Annual application of byproduct material or radiolabeled chemicals to the Field Test Plot did not exceed ten (10) millicuries (mCi). Therefore, the radiological impact from the performance of field studies with radiolabeled materials at the Stine Farm 14C Field Test Plot can be described using the annual maximum allowable radioactivity release of ≤10 mCi in a single year.

4.2 Boundaries of the Stine Farm 14C Field Test Plot

The defined boundaries of the Stine Farm 14C Field Test Plot form a rectangle that is enclosed on four sides, predominantly by a 4ft high wire mesh fence that measures 130ft (in the east to west direction) x 100ft (in the north to south direction) that approximates a plot size of approximately 13,000ft^2 (***See Figure 3-4: Stine Farm 14C Field Test Plot Schematic***). Study participant access to the plot is through a 5ft swinging gate at the northeast corner of the plot (***See Figure 4-1: Stine Farm 14C Field Test Plot Entrance***). Access to the Site by heavy agricultural and Site maintenance equipment, e.g. tractors,

mowers, and lysimeter coring equipment, is through a pair of 5ft double-wide swinging gates on the SW side of the plot.

Figure 4-1: Stine Farm 14C Field Test Plot Entrance



The western exterior face of a wooden shed (approximately 8ft x 12ft) provides as part of the rectangular bounded plot enclosure and constitutes an approximate a 12ft section of the eastern fence border, that along with the 4ft wire mesh fence completes a contiguous rectangular envelope around the designated field plot. The door to the shed opens only to the interior of the ^{14}C Field Test Plot fenced enclosure. No ^{14}C radiolabeled test chemicals were stored, used, or kept in the shed or otherwise stored within the Stine Farm ^{14}C Field Test Plot outside of the Site approved specific study initiation parameters, procedures, and protocols for the application of ^{14}C radiolabeled agricultural chemicals to well defined subplots within the envelope of the ^{14}C Field Test Plot. All study ^{14}C radiolabeled application test chemicals and materials were only transported to the Field Test Plot on the day of application. Immediately following the intended individual subplot application, all unused ^{14}C radiolabeled application test chemicals and application tools and materials related to the study application including solvents, personal protective equipment, sprayers, transfer and sample bottles, pipets, etc. were immediately removed from the Field Test Plot Site for appropriate disposal.

4.3 Stine Farm ^{14}C Field Test Plot and Control Features

Within the outer envelope of the Stine Farm ^{14}C Field Test Plot, e.g. the 4ft wire mesh fenced area, smaller Individual Study Subplots were erected for each of the ^{14}C radiolabeled plant metabolism and soil dissipation studies performed. These small bordered and framed subplots were typically constructed of wood to delineate and provide additional controls to the effective target application areas and plants as seen in the example shown in ***Figure 4-2: Typical Metabolism Field Study Subplot***. Bird netting was used to restrict bird and small rodent access to the test plots. These delineated subplot sizes were constructed to the study specifications of approximately 2.5ft x 4ft for plant metabolism studies and approximately 3ft x 11ft for soil dissipation studies.

Figure 4-2: Typical Metabolism Field Study Subplot

Site design for the use and application of study related ^{14}C radiolabeled test chemicals was not random, but limited to well defined areas located within the bounded Stine Farm ^{14}C Field Test Plot. The construction of individual study subplots and their locations for the use and application of ^{14}C radiolabeled test chemicals was restricted to the north side of the Stine Farm ^{14}C Field Test Plot (See red shaded area of ***Figure 3-4: Stine Farm 14C Field Test Plot Schematic***). This identified area for the establishment and construction of individual ^{14}C radiolabeled test chemical study subplots encompass an area of approximately 4973ft^2 of the total 13,000 ft^2 available area within the fenced Stine Farm ^{14}C Field Test Plot. The typical layout and configuration for the allowable construction of these study subplots is also demonstrated in ***Figure 3-4***.

The construction of a typical ^{14}C radiolabeled test study subplot and their locations were limited to only a small localized area or section within the Stine Farm 14C Field Test Plot and limited to only an orientation along the two established 14C Study Orientation Lines shown in ***Figure 3-4***. Since the execution duration of each of the different individual subplot studies varied (from study initiation to termination) throughout the course of a year, ^{14}C radiolabeled test study subplots were constructed or established only where unoccupied space became available along the two 14C Study Orientation Lines. The locational placement for each of the varied studies was cycled and rotated along these two 14C Study Orientation Lines as the availability of open linear space provided for the initiation of a new study. This allowed for a maximum rotational area study subplot configuration encompassing approximately 260 linear feet within the ^{14}C Field Test Plot, at any given time. Due to program management and control limits of the release of maximum annual allowable radioactivity (10mCi) as well as the defined allowable rotational subplot available space, there was never a season or year in which the study

subplot configuration approached the linear capacity along the two 14C Study Orientation Lines of Stine Farm ^{14}C Field Test Plot.

In the remaining areas or other defined sections of the Stine Farm ^{14}C Field Test Plot, only cold or non-labeled study related test chemicals and no ^{14}C radiolabeled test chemicals were ever used or applied to the southern side of the of the Stine Farm ^{14}C Field Test Plot since the Sites inception. These sections include an area encompassing approximately 8027 ft^2 of the Stine Farm ^{14}C Field Test Plot and include those sections identified as the Maintenance Access Area (shaded green) and the Lysimeter field (shaded yellow) in ***Figure 3-4***.

Study conduct and treatment (application) procedures for the use and application of ^{14}C radiolabeled test chemicals are described in the, *Standard Operating Procedure for Stine Farm 14C Field Studies (MP0003406; 21 SEP 2000)*, and discussed further below. At the termination of each study, all remaining target vegetation specimens, that were not already extracted for the purposes defined in the study sampling protocol or any remaining invasive vegetative growth appearing within the plot over the duration of the study, were collected, bagged, and removed from the delineated effective plot area.

After termination of each study, representative soil core samples were taken from the interior of the subplot as well as the exterior of the demarcated effective subplot area. Typically, six to eight soil core samples were extracted, 1 inch in diameter and approximately 12-18 inches in depth. Core samples were analyzed to provide representative soil profile concentrations and levels of ^{14}C radioisotope present. The analysis consisted of sectioning the soil cores by depth and combusting those sectioned soils (3 sample reps of approximately 1g each of soil) using the Harvey Oxidizer. The $^{14}CO_2$ generated from the oxidizer was collected in a scintillation cocktail solvent and the ^{14}C radioisotope was assayed using a liquid Scintillation Counter (LSC). The LSC provided representative section depth profile results in dpm/gram soil. A test subplot was considered decommissioned based upon the resultant of typical depth profile assay levels as close to background as possible. Those subplot depth profile sections not demonstrating at or close to background levels of ^{14}C radioisotope (typically occurring in the top 0-4 inches of the soil profile assay) were scraped and lifted from the subplot, collected, bagged, and removed from the effective plot area. Soil re-sampling analysis was performed where appropriate to approximate assay levels as close to background as possible. Upon the determination of decommissioned status, a fresh layer of clean, uncontaminated topsoil was backfilled into the void(s) created by the assay and soil removal process, typically encompassing the removal of at least the top 4 inches of the plot at the termination of each study. Generally, any soil removed from the effective study plot was replaced with soil originating from outside the Field Test Plot area. Background levels of ^{14}C radioisotope in the soil profile were determined using a similar methodology of analyzing sample cores also taken from outside the effective study subplot areas.

At the termination of each study, previously constructed wooden study frames and subplot boundaries were disassembled, collected, bagged and removed from the plot. Each of the collected waste fractions (vegetation, soil, wood, or plastic) mentioned above were collected in double polyethylene bags placed into a 10gallon fiber pack and transferred, as low level ^{14}C radiolabeled waste, to the NRC approved incinerator at the Experimental Station for disposal.

In addition to the delineated subplots described above, some other field studies performed within the Stine Farm ^{14}C Field Test Plot area included the use of plants in potted soil, e.g. confined crop rotation studies. These potted plants, containing the study target plant species, were typically of a capacity that

ranged in size from 3.0gal (11" diameter x 9 ½" Deep) to 10.0gal (14 ½" diameter x 14 ½" Deep). The potted plants and their containers used in these studies were never in direct contact with the surrounding bare ground within the Stine Farm ^{14}C Field Test Plot. Typically, a polyethylene plastic ground cover was first placed onto a spot along the bare ground within the linear parameters of the 14C Study Orientation Lines. A pallet was placed on top of the polyethylene plastic ground cover and then the pallet was covered with another sheet of polyethylene plastic. The potted plants were placed on top of this protective ground cover.

Whether the study was performed in a pot or a subplot, it was sometimes necessary to either extend the study growing season of the target plants, protect the target plants from adverse weather, or protect the target plants from invasive animals (bird, rodents, etc.). In these instances, a cold frame or miniature greenhouse structure was constructed to protect the target study plants from any unwanted or detrimental conditions. They were constructed in sizes sufficient to adequately cover the intended target plants and those areas defined by the study. They were constructed using a metal housing frame, whereby the frame was covered using a transparent polyethylene film. As in the subplot studies described above; at the termination of each study utilizing potted plants, all remaining target vegetation specimens (including the potted soil itself) that were not already extracted for the purposes defined in the study sampling protocol over the duration of the study, were lifted, collected, bagged, and removed from the effective plot area and sent to the NRC approved incinerator at the Experimental Station for disposal. This included all unwanted study materials including; remaining potted soil and vegetation, potting containers, plastic pallet covers, pallets, etc.

In all studies performed at the Stine Farm ^{14}C Field Test Plot, treatment procedures and controls of ^{14}C radiolabeled materials were used to minimize application contamination of nontarget areas. Examples of the application controls for pot and subplot studies are described in the Standard Operating Procedures (SOPs; *MP0003406; 21 SEP 2000*) as follows;

Pots: *Prior to spray application, place 3 bamboo stakes into the pot and pull a plastic bag over the entire setup. Cut a small slit in the plastic bag approximately six inches above the surface to be sprayed. After spray application, cut the plastic bag and allow to air dry. Carefully remove the plastic bag and dispose of properly. The stakes can stay in place or be placed in the radioactive waste for proper disposal.*
Plots: *Prior to spray application, place a wooden stake in each corner of the plot. Wrap polyethylene around the stakes and secure with tape. Make sure that the bottom edge is placed inside the plot and the top edge is several feet higher that the surface to be sprayed. When finished spraying, let air dry and dispose of the plastic as radioactive waste. (any drift will show up on the plastic as droplets).*

Also, installed within the Stine Farm ^{14}C Field Test Plot, is an elevated field of encased lysimeter cores and self-contained lysimters used for the purposes of Column Leaching Studies. Within the bounded Stine Farm ^{14}C Field Test Plot, on the southern side of the plot, a field of self-contained lysimter cores was installed ranging in depth from 1-6ft into the ground. This field consisted of 4 rows of installed lysimeters, see shaded area (yellow) of ***Figure 3-4: Stine Farm 14C Field Test Plot Schematic*** This lysimeter field is slightly elevated above the surrounding sections within the Stine Farm ^{14}C Field Test Plot. The western edge of the lysimeter field (the side closest to the heavy equipment access gates), gently rises above the surrounding base elevation of the Stine Farm ^{14}C Field Test Plot, to an elevation of 2-3ft on the eastern edge of the lysimeter field. The elevated lysimeter field essentially slopes upward approximately 2-3ft from the west to the east side of the lysimeter field. Since the installation of the lysimeters to the lysimeter field within the Stine Farm ^{14}C Field Test Plot, only cold (non-labeled)

pesticides were used for study purposes within this lysimeter field. No ^{14}C radiolabeled test chemicals were ever used or applied to the lysimeters located within the lysimeter field of the Stine Farm ^{14}C Field Test Plot.

There are two types of lysimeters installed within this subplot field as follows;

- large square self-contained Stainless Steel lysimeter macrobins (~1m x 1m); 6 total
- circular PVC lysimeters (~30cm diameter; 1-6ft depth); 72 total (See ***Figure 4-3: Lysimeter Core Inside Outer Casing*** and ***Figure 4-4: Lysimeter with Weather Protective Sleeve***)

Each lysimeter core casing is installed inside of a secure external housing and a hose is provided to access the leachate that collects at the bottom of the external housing.

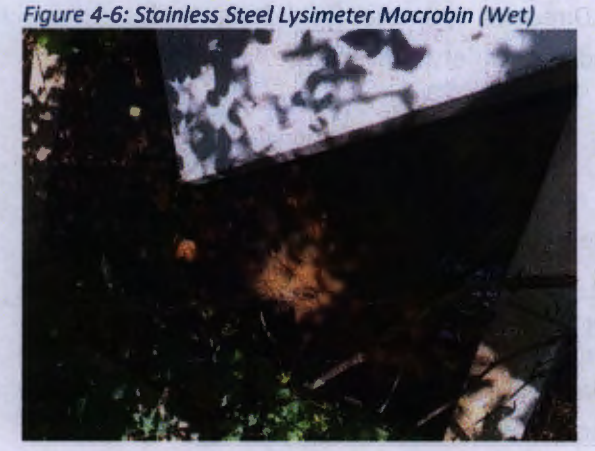
Figure 4-3: Lysimeter Core Inside Outer Casing

Figure 4-4: Lysimeter with Weather Protective Sleeve

After the lysimeter is installed, a rubber sleeve is placed in the annular space at the top to help insulate the lysimeter and to protect against surface water infiltration. In addition, a sloped ring is placed on the top that has the same ID as the lysimeter itself but to divert water from the annular space.

Figure 4-5: Stainless Steel Lysimeter Macrobin (Dry)

Figure 4-6: Stainless Steel Lysimeter Macrobin (Wet)



4.4 Documents Reviewed

In performing the Stine Farm ^{14}C Field Test Plot Historical Site Assessment (HSA) the following documents were reviewed:

- License and Technical Specifications
  - Technical Specification Changes
  - License amendments
- Original Plot Design
  - Function and purpose of systems and structures
  - Plot operating parameters for R&D Studies
  - Plot operating procedures for R&D Studies
- Original Plot Study Protocols, Reports, Drawings and Photographs
  - Plot Specifications for systems and structures
  - Plot R&D Work Control Documents and Site Modifications
  - Plot Conditions and Reports
  - Plot Operating History
  - Plot Radiological Study Protocols
  - Plot Radiological Study Reports

  - Plot Radiological Annual Summary Study Reports
  - Plot Operating Procedures Regarding Spills and Unplanned Releases
  - Plot Radiological Environmental Monitoring Program Reports
- Radiological Surveys and Assessments
  - Radiological surveys performed in support of normal plot operations and maintenance
  - Radiological surveys performed in support of special plot operations and maintenance
- Radiological Waste Disposal
  - NRC approved incinerator at the Experimental Station for disposal

4.5 Personal Interviews

Personnel interviews were conducted with previous Radioisotope Field Study Coordinators, metabolism and environmental fate Principal Investigators and Study Directors, Lysimeter Field design and installation Architect and Custodian, and previous Site Radiation Safety Officers.

References

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Appendix I

Additional Site Photos - Stine Farm 14C Field Test Plot

Additional Site Photos - Stine Farm 14C Field Test Plot (Continued)

Attachment B

Soil Sample Analysis Report, From ESC

ESC
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NJ TN002

Case Narrative

Lab No: 20170924

This report contains the analytical results for the 62 sample(s) received under chain of custody by ESC Lab Sciences on 9/29/2017 9:12:37 AM. These samples are associated with your 350 Dupont AG project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted below:

The test results in this report meet all NELAC requirements unless noted below:

This report shall not be reproduced, except in full, without the written approval of ESC Lab Sciences.

All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client.

Results have been reviewed by the Director of Radiochemistry or their designees and is approved for release.

DL for Radiochemistry = MDA DL for Metals and Wet Chemistry = MDL DL for Drinking Water = SDWA

Observations / Nonconformances

L940941
Sample(s) were receieved out of hold temperature.
Sample(s) were analyzed as is.

Report was amended 11/16/17 to correct results due to incorrect units entered in spreadsheet.

ESC Lab Sciences
12065 Lebanon Rd, Mt. Juliet, TN 37122 (1-800) 767-5859 www.ESCLabSciences.com

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-01**								
Client ID : **B1 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.097 +/- 0.271	0.463	pCi/g		10/18/17	11/07/17	RT
Lab ID : **20170924-02**								
Client ID : **B1 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.127 +/- 0.341	0.561	pCi/g		10/18/17	11/07/17	RT
Lab ID : **20170924-03**								
Client ID : **B1 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.280 +/- 0.285	0.505	pCi/g		10/18/17	11/07/17	RT
Lab ID : **20170924-04**								
Client ID : **B2 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.287 +/- 0.335	0.587	pCi/g		10/18/17	11/07/17	RT
Lab ID : **20170924-05**								
Client ID : **B2 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.844 +/- 0.383	0.568	pCi/g		10/18/17	11/07/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-06**								
Client ID : **B2 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	1.30 +/- 0.381	0.532	pCi/g		10/18/17	11/07/17	RT
Lab ID : **20170924-07**								
Client ID : **B3 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.393 +/- 0.321	0.506	pCi/g		10/18/17	11/07/17	RT
Lab ID : **20170924-08**								
Client ID : **B3 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.456 +/- 0.271	0.414	pCi/g		10/18/17	11/07/17	RT
Lab ID : **20170924-09**								
Client ID : **B3 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.160 +/- 0.253	0.442	pCi/g		10/18/17	11/07/17	RT
Lab ID : **20170924-10**								
Client ID : **B4 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.582 +/- 0.404	0.722	pCi/g		10/18/17	11/07/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-11**								
Client ID : **B4 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.191 +/- 0.357	0.585	pCi/g		10/18/17	11/07/17	RT
Lab ID : **20170924-12**								
Client ID : **B4 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.009 +/- 0.351	0.590	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-13**								
Client ID : **Sample 1 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.267 +/- 0.415	0.719	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-14**								
Client ID : **Sample 1 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	1.06 +/- 0.449	0.683	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-15**								
Client ID : **Sample 1 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.053 +/- 0.178	0.303	pCi/g		10/19/17	11/07/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-16**								
Client ID : **Sample 2 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.192 +/- 0.187	0.299	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-17**								
Client ID : **Sample 2 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.139 +/- 0.303	0.495	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-18**								
Client ID : **Sample 2 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.065 +/- 0.323	0.536	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-19**								
Client ID : **Sample 3 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	2.65 +/- 0.418	0.502	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-20**								
Client ID : **Sample 3 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.737 +/- 0.300	0.439	pCi/g		10/19/17	11/07/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-21**								
Client ID : **Sample 3 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.111 +/- 0.331	0.565	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-22**								
Client ID : **Sample 4 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	1.45 +/- 0.292	0.368	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-23**								
Client ID : **Sample 4 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.036 +/- 0.328	0.554	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-24**								
Client ID : **Sample 4 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	1.05 +/- 0.431	0.632	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-25**								
Client ID : **Sample 5 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.650 +/- 0.343	0.520	pCi/g		10/19/17	11/07/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-26**								
Client ID : **Sample 5 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.291 +/- 0.227	0.406	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-27**								
Client ID : **Sample 5 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.057 +/- 0.283	0.480	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-28**								
Client ID : **Sample 6 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.011 +/- 0.355	0.597	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-29**								
Client ID : **Sample 6 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.065 +/- 0.361	0.601	pCi/g		10/19/17	11/07/17	RT
Lab ID : **20170924-30**								
Client ID : **Sample 6 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.294 +/- 0.348	0.563	pCi/g		10/19/17	11/07/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-31**								
Client ID : **Sample 7 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.101 +/- 0.321	0.531	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-32**								
Client ID : **Sample 7 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0 +/- 0.340	0.571	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-33**								
Client ID : **Sample 7 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.298 +/- 0.334	0.537	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-34**								
Client ID : **Sample 8 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.010 +/- 0.117	0.196	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-35**								
Client ID : **Sample 8 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.067 +/- 0.233	0.385	pCi/g		10/20/17	11/07/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-36**								
Client ID : **Sample 8 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.010 +/- 0.132	0.220	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-37**								
Client ID : **Sample 9 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	6.83 +/- 0.561	0.475	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-38**								
Client ID : **Sample 9 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	4.23 +/- 0.439	0.468	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-39**								
Client ID : **Sample 9 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.501 +/- 0.225	0.334	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-40**								
Client ID : **Sample 10 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.046 +/- 0.318	0.537	pCi/g		10/20/17	11/07/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-41**								
Client ID : **Sample 10 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.686 +/- 0.404	0.630	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-42**								
Client ID : **Sample 10 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.128 +/- 0.239	0.392	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-43**								
Client ID : **Sample 11 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.703 +/- 0.295	0.443	pCi/g		10/20/17	11/07/17	RT
Lab ID : **20170924-44**								
Client ID : **Sample 11 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.070 +/- 0.383	0.648	pCi/g		10/20/17	11/08/17	RT
Lab ID : **20170924-45**								
Client ID : **Sample 11 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.135 +/- 0.268	0.441	pCi/g		10/20/17	11/08/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-46**								
Client ID : **Sample 12 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.046 +/- 0.129	0.220	pCi/g		10/20/17	11/08/17	RT
Lab ID : **20170924-47**								
Client ID : **Sample 12 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.018 +/- 0.170	0.287	pCi/g		10/20/17	11/08/17	RT
Lab ID : **20170924-48**								
Client ID : **Sample 12 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.485 +/- 0.171	0.241	pCi/g		10/20/17	11/08/17	RT
Lab ID : **20170924-49**								
Client ID : **Sample 13 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.201 +/- 0.159	0.251	pCi/g		10/21/17	11/08/17	RT
Lab ID : **20170924-50**								
Client ID : **Sample 13 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.558 +/- 0.190	0.373	pCi/g		10/21/17	11/08/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-51**								
Client ID : **Sample 13 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.772 +/- 0.291	0.420	pCi/g		10/21/17	11/08/17	RT
Lab ID : **20170924-52**								
Client ID : **Sample 14 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.050 +/- 0.248	0.420	pCi/g		10/21/17	11/08/17	RT
Lab ID : **20170924-53**								
Client ID : **Sample 14 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.382 +/- 0.304	0.544	pCi/g		10/21/17	11/08/17	RT
Lab ID : **20170924-54**								
Client ID : **Sample 14 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.006 +/- 0.211	0.353	pCi/g		10/21/17	11/08/17	RT
Lab ID : **20170924-55**								
Client ID : **Sample 15 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.124 +/- 0.213	0.368	pCi/g		10/21/17	11/08/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-56**								
Client ID : **Sample 15 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.474 +/- 0.262	0.401	pCi/g		10/21/17	11/08/17	RT
Lab ID : **20170924-57**								
Client ID : **Sample 15 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.433 +/- 0.225	0.339	pCi/g		10/21/17	11/07/17	RT
Lab ID : **20170924-58**								
Client ID : **Sample 16 A**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	-0.348 +/- 0.292	0.520	pCi/g		10/21/17	11/07/17	RT
Lab ID : **20170924-59**								
Client ID : **Sample 16 B**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.145 +/- 0.170	0.271	pCi/g		10/21/17	11/07/17	RT
Lab ID : **20170924-60**								
Client ID : **Sample 16 C**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
		Radiochemical Analyses						
Carbon-14	EPA EERF C01	0.383 +/- 0.285	0.452	pCi/g		10/21/17	11/07/17	RT

Analytical Report

	Method	Result	DL	Units	Qual	Prep Date	Analysis Date	Analyst
Lab ID : **20170924-61**								
Client ID : **Small Lysimeter**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	-0.224 +/- 0.252	0.439	pCi/g		10/21/17	11/07/17	RT
Lab ID : **20170924-62**								
Client ID : **Large Lysimeter**								
Date Sampled : **9/21/2017**								
Matrix : **SCM**								
	Radiochemical Analyses							
Carbon-14	EPA EERF C01	0.296 +/- 0.192	0.299	pCi/g		10/21/17	11/07/17	

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	RER, NAD or DER	MS %REC	MSD %REC	MSD RPD	Batch ID
Carbon-14	-0.422	13.3			NC	0.463	0.3			C3-023
Carbon-14	-0.347	10.7			NC	0.080	15.5	13.7	11.7	C3-021
Carbon-14	-0.289	11.7			NC	0.205	9.4	12.3	29.5	C3-019
Carbon-14	-0.312	12.1			NC	0.188	19.3	14.2	30.4	C3-017

Lab Approval:

Ron Eidson
Director of Radiochemistry

*NELAC Certified Parameter BDL = Below Detection Limit

ESC Lab Sciences
12065 Lebanon Rd, Mt. Juliet, TN 37122 (1-800) 767-5859 www.ESCLabSciences.com

Attachment C

Liquid Scintillation Counter Results

2017-330

Assay Definition-

Assay Description:
Wipe and Leak Tests

Assay Type: DPM (Triple)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\RSO INC\Triple Lable DPM
Raw Results Path: C:\Packard\Tricarb\Results\RSO INC\Triple Lable DPM\20170926_0958.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\RSO INC\Triple Lable DPM\1410.csv
Assay File Name: C:\Packard\TriCarb\Assays\Triple Lable DPM.lsa

Count Conditions-

Nuclide: Triple Label
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Sets:
Low Energy: 3H-UG-02212017
Mid Energy: 14C-UG-01162017
High Energy: 32P-UG-02-28-05
Count Time (min): 5.00
Count Mode: Normal
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: On - 1st Vial
Low CPM Threshold: Off
2 Sigma % Terminator: On - Any Region

Regions	LL	UL	Bkg Subtract	2Sigma % Terminator
A	0.0	12.0	1st Vial	0.00
B	12.0	156.0	1st Vial	0.00
C	156.0	2000.0	1st Vial	0.00

Count Corrections-

Static Controller: On Luminescence Correction: On
Colored Samples: Off Heterogeneity Monitor: n/a
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				
B				
C				

Cycle 1 Results

	S#	PID	Time	CPMA	CPMB	CPMC	DPM1	DPM2	DPM3	tSIE	LUM	DATE
BKGD	1	33	10.00	5	11	6	0	0	0	664	2	9/26/17
SHED	2	33	5.00	2	-1	1	3	-1	1	678	3	9/26/17
	3	33	5.00	-1	-1	-2	-2	-1	-2	674	3	9/26/17
	4	33	5.00	-2	-1	-0	-5	-1	-0	682	5	9/26/17
	5	33	5.00	2	-2	-2	6	-3	-2	672	6	9/26/17
	6	33	5.00	-1	0	1	-2	-0	1	513	6	9/26/17
	7	33	5.00	2	0	0	4	-0	1	625	4	9/26/17

FC 9/26/17

2017-330

SHLD	8	33	5.00	0	-3	0	1	-4	0	636	6	9/26/17
	9	33	5.00	-2	-3	-0	-5	-3	-0	499	25	9/26/17
	10	33	5.00	-0	-1	1	-0	-1	2	576	4	9/26/17
↓	11	33	5.00	-0	-1	-1	-0	-1	-1	585	7	9/26/17
A2	12	33	5.00	1	-3	-1	3	-4	-1	639	7	9/26/17
C6	13	33	5.00	-2	-3	1	-5	-3	1	463	11	9/26/17
C9	14	33	5.00	-1	-2	-1	-2	-3	-1	567	5	9/26/17
C11	15	33	5.00	-4	-2	-0	-14	-2	-0	279	12	9/26/17

TC 9/26/17

Attachment D

Survey Meter Calibrations

RSO, Inc.
P.O. Box 1450
Laurel, MD 20725
(301) 953-2482

RSO Job No. 12174

Certificate of Calibration

ISSUED TO: RSO, Inc.
5206 Minnick Road
Laurel, MD 20707

CONTACT: Paul Madairy
PHONE:

INSTRUMENT: VICTOREEN
MODEL: 450P
TYPE: RATEMETER
SN: 2550

PO NO: RSO 370

RSO, Inc. certifies that on 09/21/2016 the above described instrument was calibrated in a known radiation field using Cs-137 (662keV) beam calibrators J.L. Shepherd Model 28-6A, S/N 10056 and Atomchem Corp. Model 1032, S/N 038.

The results are tabulated below. Calibration is traceable to NIST.

Calibration Data

RANGE	EXPECTED	OBSERVED		C.F.	NOTE
AUTO	100	110	uR/hr	0.91	
	400	360	uR/hr	1.11	
RANGING	1	1.02	mR/hr	0.98	
	4	3.9	mR/hr	1.03	
SCALE	10	10.3	mR/hr	0.97	
	40	40	mR/hr	1.00	
	100	100	mR/hr	1.00	
	400	400	mR/hr	1.00	
	1	0.98	R/hr	1.02	
	4	4.2	R/hr	0.95	
	100	98	mR	1.02	*
		N/A	mR		
		C.F. AVERAGE		1.00	

Notes
* Dose measured for 10 minutes in a 600 mR/hr Cs-137 field.

Probe type(s) **Probe1:** ION CHAMBER **Probe2:** **Probe3:**

MODEL	SER#	WINDOW	GEOMETRY	VOLT	ISOTOPE 1	EFF.(%)	ISOTOPE 2	EFF.(%)	ISOTOPE 3	EFF.(%)	ISOTOPE 4	EFF.(%)
INTERNAL		NONE	FRONT									

Note: "As Found" condition +/- 10% of Expected values unless indicated.

INSTRUMENT CHECKS

BATTERY CHECK: NORMAL
CHECK SOURCE 1: N/A READING:
CHECK SOURCE 2: N/A READING:

ENVIRONMENTAL

TEMP: 24°C
PRESS: 766 mmHg
HUMID: 57 %

THE SUGGESTED RECALIBRATION DATE FOR THIS INSTRUMENT IS **09/21/2017**

Calibrated By: Korressa Williams Reviewed By: Cal Date: 09/21/2016

Maryland License MD-33-021-01

19321

NRC FORM 532
(05-2016)

U.S. NUCLEAR REGULATORY COMMISSION

ACKNOWLEDGEMENT - RECEIPT OF CORRESPONDENCE

Name and Address of Applicant and/or Licensee

E. I. du Pont de Nemours and Company, Inc.
ATTN: Robert P. Lengel, du Pont Site Facilities Manager
200 Powder Mill Road
PO Box 8352
Wilmington, DE 19803

Date
May 10, 2018

License Number(s)
07-13441-02

Mail Control Number(s)
608751

Licensing and/or Technical Reviewer or Branch
Commercial, Industrial, R&D, & Academic Branch

This is to acknowledge receipt of your: ☑ **Letter and/or** ☐ **Application** **Dated:** 05/02/2018

The initial processing, which included an administrative review, has been performed.

☑ **Amendment** ☐ **Termination** ☐ **New License** ☐ **Renewal**

☑ **There were no administrative omissions identified during our initial review.**

☐ **This is to acknowledge receipt of your application for renewal of the material(s) license identified above. Your application is deemed timely filed, and accordingly, the license will not expire until final action has been taken by this office.**

☐ **Your application for a new NRC license did not include your taxpayer identification number. Please complete and submit NRC Form 531, Request for Taxpayer Identification Number, located at the following link: http://www.nrc.gov/reading-rm/doc-collections/forms/nrc531.pdf**

Follow the instructions on the form for submission.

☐ **The following administrative omissions have been identified:**

Your application has been assigned the above listed MAIL CONTROL NUMBER. When calling to inquire about this action, please refer to this control number. Your application has been forwarded to a technical reviewer. Please note that the technical review, which is normally completed within 180 days for a renewal application (90 days for all other requests), may identify additional omissions or require additional information. If you have any questions concerning the processing of your application, our contact information is listed below:

Region I
U. S. Nuclear Regulatory Commission
Division of Nuclear Materials Safety
2100 Renaissance Boulevard, Suite 100
King of Prussia, PA 19406-2713
(610) 337-5260, (610) 337-5313,
(610) 337-5398, or (610) 337-5239