Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

July 28, 2017

J6
03037785

Licensing Assistance Team
United States Nuclear Regulatory Commission
2100 Renaissance Boulevard, Suite 100
King of Prussia, Pennsylvania
19406-2713

Docket No: NRC-000-1702-1626

Dear Sir or Madame:

By letter dated May 3, 2017, the Connecticut Department of Energy and Environmental Protection (DEEP) requested Nuclear Regulatory Commission (NRC) approval of an amendment request to remove 36 Perimeter Road, Windsor Locks, Connecticut from DEEP's NRC License, No. 06-27895-02, Docket No. 03037785. In an email dated June 13, 2017, the NRC transmitted a request for additional information (RAI) to DEEP related to this license amendment request. The attachments to this letter provide DEEP's response to the NRC's RAI.

If you have any questions regarding this submittal, please contact the Radiation Safety Officer, Michael Firsick at (860) 424-3517 or michael.firsick@ct.gov.

Sincerely,

Jeffrey Semancik, Director
Air Bureau, DEEP
Radiation Division

594730


Auxiliary Building
Restoration Building
New England Air Museum
B-29 Hangar
Civilian Wing
Gauge Building
Brown Building
Military Wing
New England Air Museum
36 Perimeter Road
Windsor Locks, CT

Attachment 1

DEEP Response to NRC Request for Additional Information

The Connecticut Department of Energy and Environmental Protection (DEEP) is submitting to you the following documents in response to the US NRC's Request For Additional Information (RAI's) concerning DEEP's request to remove 36 Perimeter Road, Windsor Locks, Connecticut from our US NRC license, 06-27895-02.

RAI-1

On page 1 of your request, you state that the New England Air Museum now has less than 100 of Radium items such that it can now be regulated under 10 CFR 31.12. Please provide the documentation of the material that has been transferred

DEEP Response

The waste manifests and shipping paperwork are provided in Attachment 2.

With respect to material that remains at the location, a photo inventory of each item (which includes storage location at the museum, a contact dose rate and activity estimate) is provided as Attachment 3.

RAI-2

On page 5 of your request, you state there was a Strontium 90 source discovered in a helicopter. Please provide documentation that the source has been removed and transferred to an authorized recipient.

DEEP Response

The Strontium 90 source was not material on the DEEP license. DEEP personnel discovered this material during other activities and notified the owner and NRC. The facility owner notified the responsible licensee, the United States Coast Guard (USCG) who had the material properly removed from the site. The NRC conducted an inspection of the USCG actions including verifying the proper removal of the material. The inspection results and documentation of disposal is documented in NRC letter to Rear Admiral Baffer of the US Coast Guard from Blake Welling, Docket No., 99990001 dated May 8, 2017 and is included as Attachment 4.

RAI-3

Starting on page 132 or your request, you provided information about the soil sampling. You describe the gauge building as surrounded by asphalt and concrete but there is 18 square feet of area that has soil. The location of the soil and the size of the area open areas are difficult to review from what has been submitted. Please draw a schematic of the building, showing dimensions of how far out that there is asphalt and concrete from the building, and highlighting the open dimension of areas that contain soil and where the soil samples were taken. A couple of pictures of around the gauge building would be helpful.

DEEP Response

A schematic and color photographs of the gauge building are provided as attachment 5.

RAI-4

On Page 72 you describe the gage building and on page 132 you describe the surrounding area. The inside of the gauge building was determined to be a class one zone and some soil samples around the facility were above the screening value for Ra-226. It appears that the concrete and asphalt areas surrounding the gauge building were not surveyed. Please describe surveys in this area is not needed or perform surveys in this area to determine that the surface area is releasable.

DEEP Response

A walk over survey of the area surrounding the gauge building was conducted using a high sensitivity gamma detecetor. All readings were below detection threshold. A survey map of the outside of the gauge building is provided as Attachment 6.

RAI-5

On Page 156, you provide your DandD calculation for the radioactivity in the soil at the gauge building. Please provide some additional justification for the following inputs of the calculation:

a. *You used Ra-226 instead of Ra-226 + C. Please describe why the daughters of Ra-226 were not considered in the calculation for the initial dose as it appears the contamination occurred over a number of years.*

DEEP Response

Using the DandD modeling code, Ra-226 was a more conservative selection in our dose calculation versus Ra-226+C. The 1st decay product of the Ra-226 decay chain is Rn-222, a gas, and would have dissipated into the atmosphere (since the contamination was located in an outside environment) resulting in a significant reduction in dose and, therefore, the lower Annual TEDE for the Ra-226+C. DandD modeling code results are enclosed in Attachment 7 and summarized in the following table.

Contaminant in Soil	Concentration (pCi/gm)	Area (m^2)	Calculated Annual TEDE (mRem)
Ra-226	40†	10††	18.5
Ra-226+C	40	10††	2.1

† Concentration based on maximum Ra-226 allowed to remain in soil without exceeding the State of Connecticut 19 mrem annual TEDE remediation standard.

†† 10 m^2 selected based on initial estimated area of contamination. Refer to response to RAI-5.c for actual remediation area.

b. *Your initial activity input was 40 pCi/gm instead of the stated value of 4 pCi/gm. Describe why 40 pCi/gm was used instead of 4 pCi/gm?*

DEEP Response

DandD was run iteratively to determine a soil contamination screening value that resulted in a calculated annual dose less than the NRC's 25 mrem limit and the State of Connecticut's 10 mrem standard. The calculations resulted in 40 pCi/gm value for Ra-226. The table below shows the actual soil concentration, post remediation, and the associated DandD calculated annual TEDE doses using both Ra-226 and Ra-226+C. The area used reflects the actual remediated area (refer to DEEP Response to RAI-5.c below).

Contaminant in Soil	Concentration (pCi/gm)	Area (m^2)	Calculated Annual TEDE (mRem)
Ra-226	2.36	4.6	0.5
Ra-226+C	2.36	4.6	0.05

c. *You used 10 square meters for the size of the contamination. Your description states that this is only 18 square feet or about 2 square meters. Please state why you used a value of 10 square meters.*

DEEP Response

Initial estimates of the bounded area were reported to be 10 m^2 and the initial DandD calculations used this estimate. The actual area of remediation was 4.6 m^2. A shown in DEEP Response to RAI-5.a and b, the annual TEDE dose results of the DandD modeling code associated with both 4.6 m^2 and 10 m^2 areas are well below the NRC's 25 mrem limit and the State of Connecticut's 19 mrem standard.

RAI-6

It appears that the museum has aircraft displays outside of the museum buildings. No surveys were submitted for this region. Please discuss why there no surveys were presented for these outside display area.

DEEP Response

All gauges in the aircraft remain installed. Nevertheless, DEEP conducted surveys of these aircraft and found no contamination. The surveys of planes located outside which contain radium gauges and devices is provided as Attachment 8.

ATTACHMENT 2

Waste and Shipping Manifests

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

EMERGENCY TELEPHONE NUMBER (INCLUDE AREA CODE)	800-424-9300
ORGANIZATION	CHEMTREC WSDS #: CHEN01RAD Customer #: 4395
[ ] YES [x] NO	TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 7
[ ] YES [x] NO	N/A

5. SHIPPER - NAME AND FACILITY	SHIPPER ID #	PAGE	3. Manifest Number
Chase Environmental Group, Inc. 11450 Walterson Court Louisville, KY 40299	N/A X	PAGE 1 OF 1 PAGE(S); 1 PAGE(S); 1 PAGE(S); None PAGE(S)	AL-2016-372
PERMIT NUMBER T-KY003-L16 / N/A		7. CONSIGNEE NAME AND FACILITY ADDRESS: Alaron Corporation 2138 State Route 18 Wampum, PA 16157	Contact: Mike Ollowski; Telephone Number (Include area code): 724-535-5777
CONTACT Seb Cannata	TELEPHONE # 860-306-0195	Lee	Date 12-13-16
6. CARRIER NAME AND ADDRESS: SJ Transportation Co., Inc. PO Box 169 Woodstown, NJ 08098	EPA ID # NJD071629976; SHIPPING DATE 11/22/2016	10. Certification	
CONTACT Kevin Elder	TELEPHONE # 856-769-2741	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.	
SIGNATURE [signature]	DATE 11/22/16	AUTHORIZED SIGNATURE [signature]; TITLE Technician / Driver	DATE 11/22/16

HM	11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number)	12. DOT LABEL	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 m³	19. ID NUMBER OF PACKAGE
X	UN2915 Radioactive material, Type A packge, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	4.55E-01	N/A	0.212	Drum 1
	Non DOT Regulated Material One drum with DAW for disposal	N/A	N/A	Solid/Oxide	Ra-226	3.03E-01	N/A	0.212	Drum 2
	Non DOT Regulated Material One drum with DAW for disposal	N/A	N/A	Solid/Oxide	Ra-226	1.21E-01	N/A	0.212	Drum 3
	Non DOT Regulated Material One drum with DAW for disposal	N/A	N/A	Solid/Oxide	Ra-226	4.55E-02	N/A	0.212	Drum 4
X	UN2915 Radioactive material, Type A packge, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	1.52E+00	N/A	0.212	Drum 5
	Non DOT Regulated Material One drum with DAW for disposal	N/A	N/A	Solid/Oxide	Ra-226	3.034E-02	N/A	0.212	Drum 6
	Non DOT Regulated Material One drum with soil for disposal	N/A	N/A	Solid/Oxide	Ra-226	3.034E-02	N/A	0.212	Drum 7

11-1) ERG#163

11-5) ERG# 163

(New England Air Museum)

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

[signature] Print name — Signature — Date [date]

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

16-0802

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

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [ ] YES [x] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 10

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS 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-L14
SHIPMENT #: N/A
GENERATOR TYPE (SPECIFY)

CONTACT: Seb Cannata
TELEPHONE #: 860-306-0195

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

EPA ID #: NJD071629976
SHIPPING DATE: 4/23/2014

CONTACT: Kevin Elder
TELEPHONE #: 856-769-2741

SIGNATURE: Joseph Grenier
DATE: 4/23/14

7. NRC FORM 540 AND 540A PAGE 1 _2_ PAGE(S)
NRC FORM 541 AND 541A OF _2_ 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)
TO-2014-105

9. CONSIGNEE-NAME AND FACILITY ADDRESS
TOXCO, Inc.
109 Flint Road
Oak Ridge, TN 37830

Contact: Rick Low
Telephone Number (include area code): 865-482-5532

SIGNATURE-Authorized consignee acknowledging waste reciept

Date

10. Certification

This is to certify that the herein named materials 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. This also certifies that the materials are classified, packaged, marked and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10CFR parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: Joseph Grenier
TITLE: Tech
DATE: 4/23/14

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
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.2	Solid/Oxide	Ra-226	5.51E+00	NA	0.212	TO-CT-E-14-195 (NEAM #3)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.2	Solid/Oxide	Ra-226	7.36E+00	NA	0.212	TO-CT-E-14-196 (NEAM #10)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	7.40E-01	NA	0.212	TO-CT-E-14-197 (NEAM #1)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	White-I	N/A	Solid/Oxide	Ra-226	3.66E-01	NA	0.212	TO-CT-E-14-198 (NEAM #2)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	White-I	N/A	Solid/Oxide	Ra-226	7.40E-01	NA	0.212	TO-CT-E-14-199 (NEAM #4)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	White-I	N/A	Solid/Oxide	Ra-226	1.84E+00	NA	0.212	TO-CT-E-14-200 (NEAM #5)

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.

Michael E. Fiorick — Print name
Michael E. Fiorick — Signature
4/23/14 — Date

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 540A

U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
SHIPPING PAPER (CONTINUATION)

8. Manifest Number
(Use this number on all continuation pages)
TO-2014-105
PAGE_2_OF_2_PAGE(S)

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 SI UNITS	17 LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME m^3	19. ID NUMBER OF PACKAGE
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	7.40E-01	NA	0.212	TO-CT-E-14-201 (NEAM #6)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	3.66E-01	NA	0.212	TO-CT-E-14-202 (NEAM #7)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.3	Solid/Oxide	Ra-226	1.10E+01	NA	0.212	TO-CT-E-14-203 (NEAM #8)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	3.66E-01	NA	0.212	TO-CT-E-14-204 (NEAM #9)

CONSIGNEE ORIGIN (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 541 — US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
CONTAINER AND WASTE DESCRIPTION

1. MANIFEST TOTALS							2. MANIFEST NUMBER
NUMBER OF PACKAGES	NET WASTE VOL. m3	NET WASTE WGHT kg	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL	TO-2014-105
10	2.120	708	NP	NP	NP	NP	3. PAGE 1 OF 2 PAGE(S)
ACTIVITY (MBq/mCi) ALL NUCLIDES		TRITIUM	C-14	Tc-99	I-129	SOURCE (kg)	4. SHIPPER NAME
2.91E+01 MBq		NP	NP	NP	NP	0.00E+00	Chase Environmental Group
7.85E-01 mCi							SHIPPER ID NUMBER N/A

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER								16. WASTE CLASS AS-A STABLE AU-A UNSTABLE B-CLASS B C-CLASS C
							PHYSICAL DESCRIPTION			14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION			
5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR NUMBER	6 CONTAINER DESCRIPTION (See Note 1)	7 VOLUME (m3)	8 WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL _X_ uSv/hr ___ mSv/hr	10. SURFACE CONTAMINATION MBq/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2)	12. Approximate WASTE VOLUME(m3) IN CONTAINER (m3)	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL: OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT Nuclide	MBq	mCi	
TO-CT-E-14-195 1347	4	0.212	125	20	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	5.51E+00	1.49E-01	NA
												Package total	**5.51E+00**	**1.49E-01**	
TO-CT-E-14-196 1347	4	0.212	142	40	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7.36E+00	1.99E-01	NA
												Package total	**7.36E+00**	**1.99E-01**	
TO-CT-E-14-197 1347	4	0.212	52	7	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7.40E-01	2.00E-02	NA
												Package total	**7.40E-01**	**2.00E-02**	
TO-CT-E-14-198 1347	4	0.212	50	0.2	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	3.66E-01	9.90E-03	NA
												Package total	**3.66E-01**	**9.90E-03**	
TO-CT-E-14-199 1347	4	0.212	54	0.4	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7.40E-01	2.00E-02	NA
												Package total	**7.40E-01**	**2.00E-02**	
TO-CT-E-14-200 1347	4	0.212	54	0.4	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	1.84E+00	4.97E-02	NA
												Package total	**1.84E+00**	**4.97E-02**	

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural overpacks, the numerical code must be followed by "OP".

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other, describe in item 6, or additional page

Note 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion Exchange Media
31. Anion Ion Exchange Media
32. Mixed Bed Ion Exchange Media
33. Contaminated Equipment
34. Organic Liquid (Except Oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (Except Animal Carcass
43. Activated Material
59. Other. Describe in Item 11, or Additional Page

Note 3: For solidification media that meet disposal site structural stability requirements, the numerical code must be followed by "-S."
For all solidification media, the vendor (manufacturer) and brand name must also be identified in item 13. Code 100 = NONE REQUIRED.

Sorption

60. Speedi Dri
61. Celatom
62. Floor Dry/ Superfine
63. HI Dri
64. Safe-T-Sorb
65. Safe-N-Dri
66. Floroo
67.Floroo X
68. Solid-A-Sorb
69. Chemsil 30
70. Chemsil 50
71. Chemsil 3030
72. Diasperl HP200
73. Diasperl HP500
74. Petroset
75. Petroset II
76. Aquaset
77. Aquaset II
89. Other. Describe in item 13, or additional page

Solidification

90. Cement
91. Concrete (Encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in item 13, or Additional Page
100. None Required

NRC FORM 541A

US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

2. MANIFEST NUMBER: TO-2014-105

3 PAGE 2 OF 2 PAGE(S)

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER								16. WASTE CLASS AS-A STABLE AU-A UNSTABLE B-CLASS B C-CLASS C
							PHYSICAL DESCRIPTION			14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION			
5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR NUMBER	6 CONTAINER DESCRIPTION (See Note 1)	7 VOLUME (m3)	8 WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL _X_ uSv/hr ___ mSv/hr	10. SURFACE CONTAMINATION MBq/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2)	12. Approximate WASTE VOLUME(S) IN CONTAINER (m3)	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT Nuclide	MBq	mCi	
TO-CT-E-14-201 1347	4	0.212	54	7	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7.40E-01	2.00E-02	NA
												Package total	**7.40E-01**	**2.00E-02**	
TO-CT-E-14-202 1347	4	0.212	63	5	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	3.66E-01	9.90E-03	NA
												Package total	**3.66E-01**	**9.90E-03**	
TO-CT-E-14-203 1347	4	0.212	54.5	13	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	1.10E+01	2.98E-01	NA
												Package total	**1.10E+01**	**2.98E-01**	
TO-CT-E-14-204 1347	4	0.212	59.5	6	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	3.66E-01	9.90E-03	NA
												Package total	**3.66E-01**	**9.90E-03**	

NRC FORM 542 (5-1998)

U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

MANIFEST INDEX AND REGIONAL COMPACT TABULATION

List all original "PROCESSED WASTE" before "COLLECTED WASTE".

1. WASTE COLLECTOR/PROCESSOR

NAME: Chase Environmental Group, Inc.

IDENTIFICATION NUMBER: T-KY003-L14

SHIPPING DATE: 4/23/2014

SHIPPER USE ONLY

2. MANIFEST NUMBER: TO-2014-105

3. PAGE_1_OF _1_PAGE(S)

4. GENERATOR IDENTIFICATION NUMBER	5. GENERATOR NAME PERMIT NUMBER AND TELEPHONE NUMBER	6. GENERATOR FACILITY ADDRESS	7. PREPROCESSED WASTE (OR MATERIAL) VOLUME (m3)	8. MANIFEST NUMBER UNDER WHICH WASTE (OR MATERIAL) RECEIVED AND DATE OF RECEIPT	9. WASTE CODE P=PROCESSED C=COLLECTED	10. ORIGINATING COMPACT OR STATE	11. AS PROCESSED/COLLECTED TOTAL A. SOURCE MATERIAL (kg)	B. SNM (g)	C. ACTIVITY (MBq)	D. VOLUME (m3)
1347	CT DEEP/New England Air Museum 860-623-3305	36 Perimeter Rd. Windsor Locks, CT 06096	2.120	NA	C	CT	0.00E+00	NP	2.91E+01	2.120
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A)							0.000	0.000	2.91E+01	2.120

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

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [ ] YES [x] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST: 3

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS 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-L14
SHIPMENT #: N/A
GENERATOR TYPE (SPECIFY):

CONTACT: Janet Baker
TELEPHONE #: 865-481-8801

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

EPA ID #: NJD071629976
SHIPPING DATE: 8/20/2014

CONTACT: Kevin Elder
TELEPHONE #: 856-769-2741

SIGNATURE: [signature]
DATE: 8/20/14

7. NRC FORM 540 AND 540A PAGE 1 OF _1_ PAGE(S)
NRC FORM 541 AND 541A _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): TO-2014-231

9. CONSIGNEE-NAME AND FACILITY ADDRESS
TOXCO, Inc.
109 Flint Road
Oak Ridge, TN 37830

Contact: Rick Low
Telephone Number (Include area code): 865-482-5532

SIGNATURE-Authorized consignee acknowledging waste reciept
Date

10. Certification

This is to certify that the herein named materials 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. This also certifies that the materials are classified, packaged, marked and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10CFR parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: [signature]
TITLE: Tech
DATE: 8/20/14

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
UN2915 Radioactive material, Type A package, 7 One drum with Gauges for disposal	Yellow II	0.1	Solid/Oxide	Ra-226	2.39E+00	NA	0.212	TO-CT-E-14-490 (NEAM #11)
UN2915 Radioactive material, Type A package, 7 One drum with Gauges for disposal	Yellow II	0.2	Solid/Oxide	Ra-226	3.54E+00	NA	0.212	TO-CT-E-14-491 (NEAM #12)
UN2915 Radioactive material, Type A package, 7 One drum with Gauges for disposal	Yellow II	0.2	Solid/Oxide	Ra-226	4.51E+00	NA	0.212	TO-CT-E-14-492 (NEAM #13)

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.

Michael E. Firsick [signature] 8/20/14
Print name Signature Date

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 541 US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
CONTAINER AND WASTE DESCRIPTION

1. MANIFEST TOTALS

NUMBER OF PACKAGES	NET WASTE VOL. m3	NET WASTE WGHT kg	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
3	0.636	356	NP	NP	NP	NP

ACTIVITY (MBq/mCi) ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE (kg)
1.04E+01 MBq	NP	NP	NP	NP	0.00E+00
2.82E-01 mCi					

2. MANIFEST NUMBER TO-2014-231

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME: Chase Environmental Group

SHIPPER ID NUMBER: N/A

DISPOSAL CONTAINER DESCRIPTION / WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER

5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR NUMBER	6. CONTAINER DESCRIPTION (See Note 1)	7. VOLUME (m3)	8. WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL _X_ uSv/hr ___ mSv/hr	10. SURFACE CONTAMINATION MBq/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2)	12. Approximate WASTE VOLUME(m3) IN CONTAINER (m3)	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	14. CHEMICAL DESCRIPTION CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	15. RADIOLOGICAL DESCRIPTION INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL: OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT Nuclide	MBq	mCi	16. WASTE CLASS AS-A STABLE AU-A UNSTABLE B-CLASS B C-CLASS C
TO-CT-E-14-490 1347	4	0.212	131	10	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	2.39E+00	6.45E-02	NA
												Package total	**2.39E+00**	**6.45E-02**	
TO-CT-E-14-491 1347	4	0.212	134	19	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	3.54E+00	9.57E-02	NA
												Package total	**3.54E+00**	**9.57E-02**	
TO-CT-E-14-492 1347	4	0.212	91	100	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	4.51E+00	1.22E-01	NA
												Package total	**4.51E+00**	**1.22E-01**	

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural overpacks, the numerical code must be followed by "OP".

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other. describe in item 6, or additional page

Note 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion Exchange Media
31. Anion Ion Exchange Media
32. Mixed Bed Ion Exchange Media
33. Contaminated Equipment
34. Organic Liquid (Except Oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (Except Animal Carcass)
43. Activated Material
59. Other. Describe in Item 11, or Additional Page

Note 3: For solidification media that meet disposal site structural stability requirements, the numerical code must be followed by "-S."
For all solidification media, the vendor (manufacturer) and brand name must also be identified in item 13. Code 100 = NONE REQUIRED.

Sorption
60. Speedi Dri
61. Celetom
62. Floor Dry/ Superfine
63. Hi Dri
64. Safe-T-Sorb
65. Safe-N-Dri
66. Floroo
67.Floroo X
68. Solid-A-Sorb
69. Chemsil 30
70. Chemsil 50
71. Chemsil 3030
72. Diapert HP200
73. Diapert HP500
74. Petroset
75. Petroset II
76. Aquaset
77. Aquaset II
89. Other. Describe in Item 13, or additional page

Solidification
90. Cement
91. Concrete (Encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in Item 13, or Additional Page
100. None Required

NRC FORM 542 (5-1998)

U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

MANIFEST INDEX AND REGIONAL COMPACT TABULATION

List all original "PROCESSED WASTE" before "COLLECTED WASTE".

1. WASTE COLLECTOR/PROCESSOR

NAME: Chase Environmental Group, Inc.

IDENTIFICATION NUMBER: T-KY003-L14

SHIPPING DATE: 8/20/2014

SHIPPER USE ONLY

2. MANIFEST NUMBER: TO-2014-231

3. PAGE_1_OF _1_PAGE(S)

4. GENERATOR IDENTIFICATION NUMBER	5. GENERATOR NAME PERMIT NUMBER AND TELEPHONE NUMBER	6. GENERATOR FACILITY ADDRESS	7. PREPROCESSED WASTE (OR MATERIAL) VOLUME (m3)	8. MANIFEST NUMBER UNDER WHICH WASTE (OR MATERIAL) RECEIVED AND DATE OF RECEIPT	9. WASTE CODE P=PROCESSED C=COLLECTED	10. ORIGINATING COMPACT OR STATE	11. AS PROCESSED/COLLECTED TOTAL A. SOURCE MATERIAL (kg)	B. SNM (g)	C. ACTIVITY (MBq)	D. VOLUME (m3)
1347	CT DEEP/New England Air Museum 860-623-3305	36 Perimeter Rd. Windsor Locks, CT 06096	0.636	NA	C	CT	0.00E+00	NP	1.04E+01	0.636
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A)							0.000	0.000	1.04E+01	0.636

NRC FORM 540

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

5. SHIPPER- NAME AND FACILITY Chase Environmental Group, Inc 11450 Watterson Court Louisville, KY 40299	SHIPPER ID # N/A X COLLECTOR PROCESSOR	PAGE 1 __2__PAGE(S) OF __2__PAGE(S) __1__PAGE(S) None PAGE(S)	6. Manifest Number TO-2014-105
USER PERMIT NUMBER T-KY003-L14	SHIPMENT # N/A	GENERATOR TYPE (SPECIFY)	9. CONSIGNEE NAME AND FACILITY ADDRESS TOXCO, Inc. 109 Flint Road Oak Ridge, TN 37830
CONTACT Seb Cannata		TELEPHONE # 860-306-0195	Contact Rick Low Telephone Number (Include area code) 865-482-5532
3. EMERGENCY TELEPHONE NUMBER (INCLUDE AREA CODE) 800-424-9300			
ORGANIZATION Chemtrec WSDS #: CHEN01RAD			
[ ] YES [x] NO	4. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST 10		
[ ] YES [x] NO	EPA MANIFEST NUMBER NA		
8. CARRIER NAME AND ADDRESS SJ Transportation Co., Inc PO Box 169 Woodstown, NJ 08098		EPA ID # NJD071629076 SHIPPING DATE 4/23/2014	SIGNATURE: Authorized consignee acknowledging waste receipt Date
CONTACT Kevin Elder		TELEPHONE # 856-769-2741	10. Certification
SIGNATURE Joseph Cannata		DATE 4/23/14	AUTHORIZED SIGNATURE Joseph Cannata TITLE Tech DATE 4/23/14

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number and any additional information)	12. EXIT LABEL RADIOACTIVE	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDE	16. TOTAL PACKAGE ACTIVITY IN MBq	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME m^3	19. ID NUMBER OF PACKAGE
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.2	Solid/Oxide	Ra-226	5.51E+00	NA	0.212	TO-CT-E-14-195 (NEAM #3)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.2	Solid/Oxide	Ra-226	7.36E+00	NA	0.212	TO-CT-E-14-196 (NEAM #10)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	7.40E-01	NA	0.212	TO-CT-E-14-197 (NEAM #1)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	White-I	N/A	Solid/Oxide	Ra-226	3.66E-01	NA	0.212	TO-CT-E-14-198 (NEAM #2)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	White-I	N/A	Solid/Oxide	Ra-226	7.40E-01	NA	0.212	TO-CT-E-14-199 (NEAM #4)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	White-I	N/A	Solid/Oxide	Ra-226	1.84E+00	NA	0.212	TO-CT-E-14-200 (NEAM #5)

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.

Michael E Fiorot — Signature — 4/23/14

Print name — Signature — Date

CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 540A

U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
SHIPPING PAPER (CONTINUATION)

8. Manifest Number
(Use this number on all continuation pages)
TO-2014-105
PAGE 2 OF 2 PAGE(S)

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 (Curies)	17 LSA/SCO CLASS	18 TOTAL WEIGHT OR VOLUME m^3	19 ID NUMBER OF PACKAGE
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	7.40E-01	NA	0.212	TO-CT-E-14-201 (NEAM #6)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	3.66E-01	NA	0.212	TO-CT-E-14-202 (NEAM #7)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.3	Solid/Oxide	Ra-226	1.10E+01	NA	0.212	TO-CT-E-14-203 (NEAM #8)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yellow-II	0.1	Solid/Oxide	Ra-226	3.66E-01	NA	0.212	TO-CT-E-14-204 (NEAM #9)

CONSIGNEE ORIGIN (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 541 — U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
CONTAINER AND WASTE DESCRIPTION

1. MANIFEST TOTALS

NUMBER OF PACKAGES	NET WASTE VOL. m3	NET WASTE WEIGHT kg	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
10	2.120	708	NP	NP	NP	NP

ACTIVITY (MBq/mCi) ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE (kg)
2.91E+01 MBq 7.85E-01 mCi	NP	NP	NP	NP	0.00E+00

2. MANIFEST NUMBER: TO-2014-105

3. PAGE 1 OF 2 PAGE(S)

4. SHIPPER NAME: Chase Environmental Group

SHIPPER ID NUMBER: N/A

DISPOSAL CONTAINER DESCRIPTION / WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER

5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR NUMBER	6. CONTAINER DESCRIPTION (See Note 1)	7. VOLUME (m3)	8. WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL mrem/hr	10. SURFACE CONTAMINATION MBq/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2)	12. Approximate waste volume (m3)	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	14. CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	15. Nuclide	MBq	mCi	16. WASTE CLASS
TO-CT-E-14-195 1347	4	0.212	125	20	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	5.51E+00	1.49E-01	NA
												Package total	5.51E+00	1.49E-01	
TO-CT-E-14-196 1347	4	0.212	142	40	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7.36E+00	1.99E-01	NA
												Package total	7.36E+00	1.99E-01	
TO-CT-E-14-197 1347	4	0.212	52	7	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7.40E-01	2.00E-02	NA
												Package total	7.40E-01	2.00E-02	
TO-CT-E-14-198 1347	4	0.212	50	0.2	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	3.66E-01	9.90E-03	NA
												Package total	3.66E-01	9.90E-03	
TO-CT-E-14-199 1347	4	0.212	54	0.4	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7.40E-01	2.00E-02	NA
												Package total	7.40E-01	2.00E-02	
TO-CT-E-14-200 1347	4	0.212	54	0.4	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	1.84E+00	4.97E-02	NA
												Package total	1.84E+00	4.97E-02	

NOTE 1: Container Description Codes. For containers [illegible] "OP." [illegible]

Note 2: Waste Descriptor Codes. [illegible]

Note 3: [illegible] Code 100 = NONE REQUIRED [illegible]

NRC FORM 541A — US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
CONTAINER AND WASTE DESCRIPTION

2 MANIFEST NUMBER: TO-2014-105

3 PAGE 2 OF 2 PAGE(S)

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER								
							PHYSICAL DESCRIPTION			14 CHEMICAL DESCRIPTION		15 RADIOLOGICAL DESCRIPTION			16 WASTE CLASS
5 CONTAINER IDENTIFICATION NUMBER/ GENERATOR NUMBER	6 CONTAINER DESCRIPTION	7 VOLUME (m3)	8 WASTE AND CONTAINER WEIGHT (kg)	9 SURFACE RADIATION LEVEL	10 SURFACE CONTAMINATION MBq/100 cm2		11 WASTE DESCRIPTION	12 Approximate waste volume (m3)	13 SORBENT SOLIDIFICATION STABILIZATION MEDIA	CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT			A, A STABLE B, A LONG-LIVED B, CLASS B C, CLASS C
					ALPHA	BETA GAMMA						Nuclide	MBq	mCi	
TO-CT-E-14-201 1347	4	0.212	54	7	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7.40E-01	2.00E-02	NA
												Package total	7.40E-01	2.00E-02	
TO-CT-E-14-202 1347	4	0.212	63	5	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	3.66E-01	9.90E-03	NA
												Package total	3.66E-01	9.90E-03	
TO-CT-E-14-203 1347	4	0.212	54.5	13	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	1.10E+01	2.98E-01	NA
												Package total	1.10E+01	2.98E-01	
TO-CT-E-14-204 1347	4	0.212	59.5	6	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	3.66E-01	9.90E-03	NA
												Package total	3.66E-01	9.90E-03	

NRC FORM 542 (8 1998) — U.S. NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

MANIFEST INDEX AND REGIONAL COMPACT TABULATION

List all original "PROCESSED WASTE" before "COLLECTED WASTE"

1 WASTE COLLECTOR/PROCESSOR
NAME: Chase Environmental Group, Inc
IDENTIFICATION NUMBER: T-KY003-L14
SHIPPING DATE: 4/23/2014

SHIPPER USE ONLY

2 MANIFEST NUMBER: TO-2014-105

3 PAGE_1_OF _1_PAGE(S)

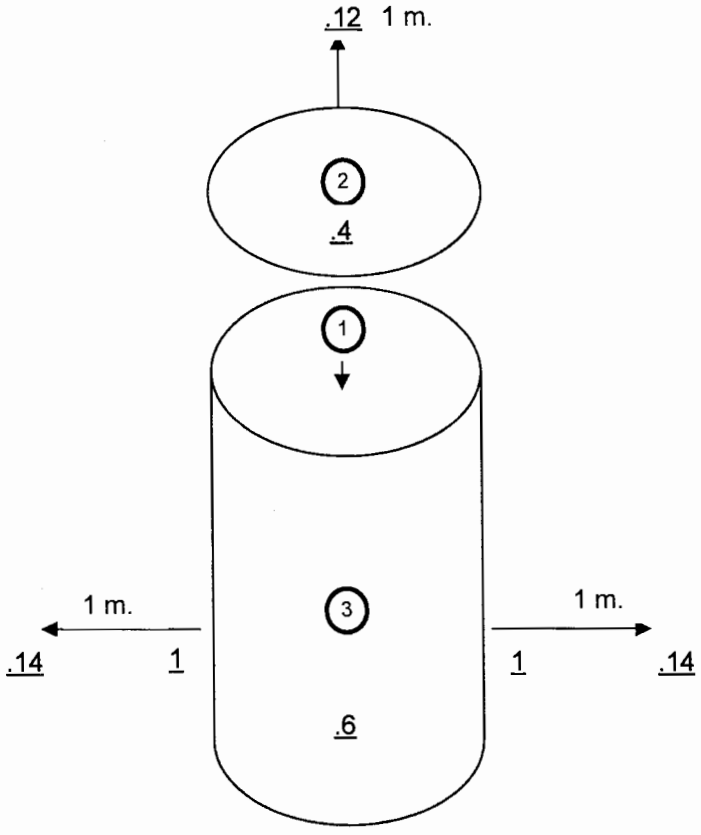
4 GENERATOR IDENTIFICATION NUMBER	5 GENERATOR NAME PERMIT NUMBER AND TELEPHONE NUMBER	6 GENERATOR FACILITY ADDRESS	7 PREPROCESSED WASTE (OR MATERIAL) VOLUME (m3)	8	9 WASTE CODE	10	11 AS PROCESSED/COLLECTED TOTAL A. SOURCE MATERIAL (kg)	B. DNM (g)	C. ACTIVITY (MBq)	D. VOLUME (m3)
1347	CT DEEP/New England Air Museum 860-623-3305	36 Perimeter Rd. Windsor Locks, CT 06096	2.120	NA	C	CT	0.00E+00	NP	2.91E+01	2.120
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A)							0.000	0.000	2.91E+01	2.120

RADIOLOGICAL SURVEY FORM

Location: NEAM

Purpose: Drum #1 Survey - Prior to Shipment to Smithsonian

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
Interior	8	ND
Top Lid	8	36
Exterior	4	50



Comments:	Instrumentation	Key O=Smear Location, Dose Rate = mR/hr γ "X"= Fixed (CCPM/DPM)α/β			
	Make: Ludlum	Model: 3030P	Serial #: 26689	Cal Due: 09/09/14	QA Check: SAT
	Make: Ludlum	Model: 14C	Serial #: 128973	Cal Due: 10/15/14	Source Check: SAT
	Make:	Model:	Serial #:	Cal Due:	QA Check:
		Performed By D. Strickland			Date: 06/26/2014
Background (s) ND ≤ Background = β 160 DPM α 0 DPM		Reviewed By M.E. Smith			Date 7/22/14

Drum Location #	DEEP NEAM #	Description	Contact Dose Rate µR/Hr	Activity Estimate µCi
1	**109**	Radio Compass, ID 90A/ARN-6	800	.8
1	**143**	Japanese Turn/Bank	3000	3.
1	**147**	Chinese Gauge (Altimeter?), 204647 inset window, 0-4 over 5-8 shows 735-750 See #153	100	.1
1	**153**	Chinese Gauge (Altimeter?), 0-10 for twice around & window with 3 digit, (710-720) See #147	200	.2
1	**155**	Landing Indicator, Type CAY 22316, MFD for NAVY DEPT - BUREAU of SHIPS, Westinghouse House, Mar 18 1940, Contract No 72521	1300	1.3
1	**158**	Indication Tachometer, Rotor and Engine Speed, Type no 981-B, Kollsman Instrument Division, A Square D Company	4500	4.5
1	**165**	Pilot Direction Indicator, Automatic Pilot, Air Corps U.S. ARMY, Order # AC 24040, Tag C-107, Part No 645262, AC Spark Plug div of General Motors under license of Sperry Gyroscope Co.	100	.1
1	**178**	Chinese Compass (?)	600	.6
1	**194**	Japanese Turn + Bank, Navy Model 2, Tokyo Koko Keiki	110	.11
1	**198**	RPM General Electric, Type DJ-13 Model 8DJ-13 AAR, 624958	1200	1.2
1	**200**	RPM, Pioneer 3474-812 , (NFI)	600	.6
1	**213**	Japanese Turn/Bank Turn?, (NFI)	20	.02
1	**217**	Compass (Japanese), Army Type 9B, Tokyo Kueiki	80	.08
1	**230**	Japanese Gauge, (Turn) and Bank, Navy MOD 2, Tanaha Heihi Seisatios	600	.6

1	**235**	Altimeter NAVY MOD 2, Japanese Gauge, Tanaha Heiki Srisakosho	2500	2.5
1	**238**	Japanese Gauge, Turn Bank	1800	1.8
1	**240**	Bendix Type 1N-4A	1000	1.
1	**247**	Japanese Fuel to Air Ratio, Army? Dual Left Right, Model 2, Yokogawa SeisaKusho	50	.05
1	**260**	Flight Hours Meter, Logdometer, Aero Instrument Co., Aircraft Type 5 Model B	100	.1
1	**282**	Dir Gyro JAPANESE, Navy Model 1, Tokyo Koko, Keiki KK	5000	5.
1	**284**	Dir Gyro JAPANESE, Navy Model I, Tokyo KoKo, Keiki KK	2100	2.1
1	**289**	Localizer Or Range, Glide Path, Weston Elec Corp, Model 888 Type 342, CAATC NO 1480	1000	1.
1	**292**	Turn+Bank (Japanese), Navy Model 2, Tanaka Keiki, Seisakoso KK	4000	4.
1	**293**	Turn + Bank (Japanese), Navy Model 2, Tanaka Keiki, Seisakasho KK.	4000	4.
1	**295**	Directional Gyro (Japanese), Navy Model 1, Tokyo Koku $80-003 , Keiki KK.	400	.4
1	**299**	Directional Gyro (Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	800	.8
1	**300**	Directional Gyro (Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	500	.5
1	**305**	Gyro Compass (Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	700	.7
1	**311**	Glide Path Localizer or Range, Model 888 Type 342, CAATC # 1480, Weston Elec	1200	1.2
1	**313**	Directional Gyro (Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	1100	1.1

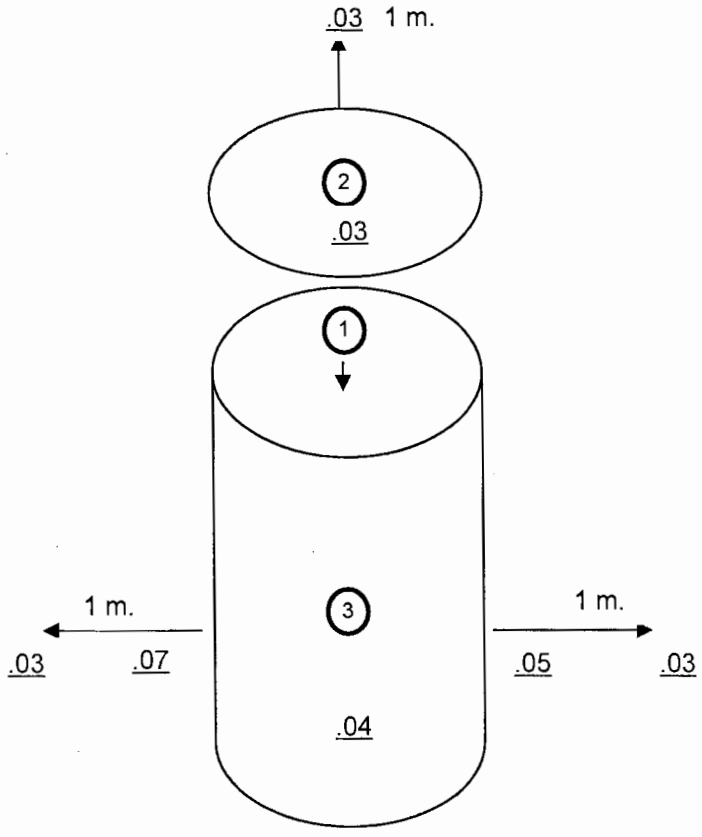
1	**314**	Gyro Horizon (Compass)(Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	800	.8
1	**419**	Magnesyn Functional Test Indicator, Pioneer Type 13318-1-A SN 1013, Bendix	5	.005
			Total μCi	40.265
			Total MBq	1.49

RADIOLOGICAL SURVEY FORM

Location: NEAM

Purpose: Drum #2 Survey - Prior to Shipment to Smithsonian

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
Interior	12	9
Top Lid	8	109
Exterior	8	64



Comments:

Instrumentation				
Make: Ludlum	Model: 3030P	Serial #: 26689	Cal Due: 09/09/14	QA Check: SAT
Make: Ludlum	Model: 14C	Serial #: 128973	Cal Due: 10/15/14	Source Check: SAT
Make:	Model:	Serial #:	Cal Due:	QA Check:

Key O=Smear Location, Dose Rate = mR/hr γ "X"= Fixed (CCPM/DPM)α/β

Performed By D. Strickland — Date: 06/26/2014

Background (s) ND ≤ Background = β 160 DPM α 0 DPM

Reviewed By M. E. Smith — Date 7/22/14

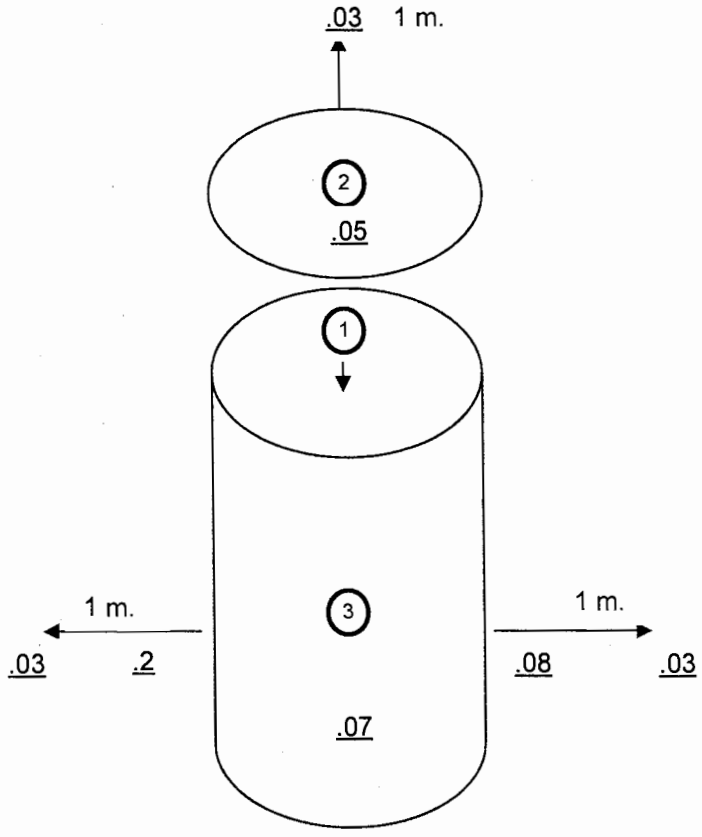
Drum Location #	DEEP NEAM #	Description	Contact Dose Rate µR/Hr	Activity Estimate µCi
2	**307**	Dashboard 11 Gauges	200	.2
			Total µCi	.2
			Total MBq	.007

RADIOLOGICAL SURVEY FORM

Location: NEAM

Purpose: Drum #3 Survey - Prior to Shipment to Smithsonian

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
Interior	4	ND
Top Lid	4	ND
Exterior	4	136



Comments:	Instrumentation	Key O=Smear Location, Dose Rate = mR/hr γ "X"= Fixed (CCPM/DPM)α/β			
	Make: Ludlum	Model: 3030P	Serial #: 26689	Cal Due: 09/09/14	QA Check: SAT
	Make: Ludlum	Model: 14C	Serial #: 128973	Cal Due: 10/15/14	Source Check: SAT
	Make:	Model:	Serial #:	Cal Due:	QA Check:
		Performed By D. Strickland			Date: 06/26/2014
Background (s) ND ≤ Background = β 160 DPM α 0 DPM		Reviewed By M.E. Trent			Date 7/22/14

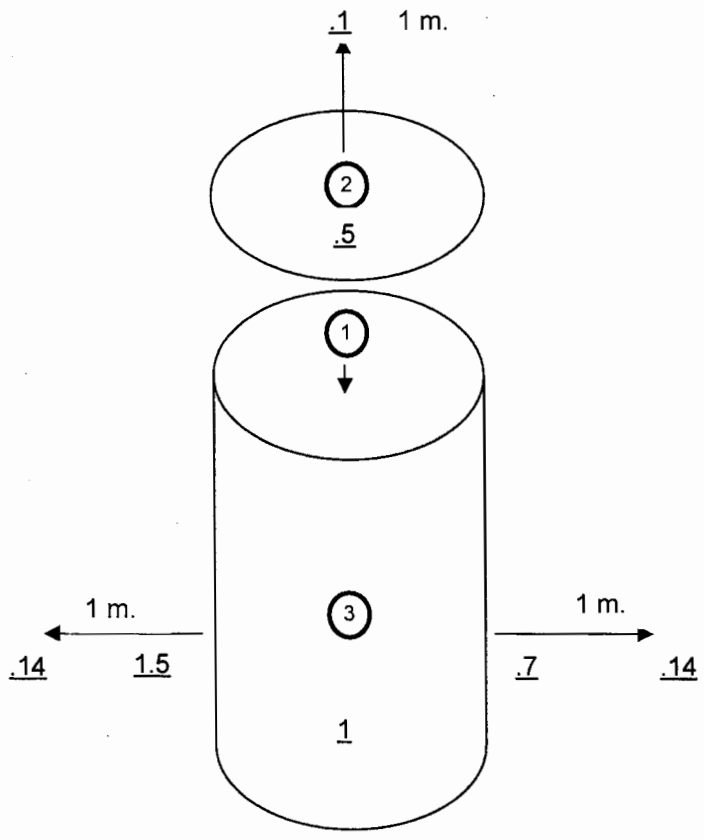
Drum Location #	DEEP NEAM #	Description	Contact Dose Rate µR/Hr	Activity Estimate µCi
3	**026**	A-5 Automatic Pilot U.S. Army	50	.05
3	**319**	Bubble Sextant w Wood Case, Mark IX WWIIRAF 1941, REENo 6B/151, Brit Pats #167, 480112 490621	10	.01
3	**331**	6 Gauge Console, (1) Altimeter Square D AC-20848, MP# 371K-05, Spec# 94-27958, (2) Horizon Bendix, MP# 14613-1AKA4, (3) Vertical Speed Kelley Inst, MP# 257K S/N 119, (4) Air Speed Kollsman, 7BK-079-7632, (5) Turn Coordinator 2 min, Brittian Industries, TC100(12) P/N 1677 S/n 511380, (6) RPM and Eng Hours, Type R78 AT2053	1500	1.5
3	**400**	3 Guage Panel (German), Führerhaube, (1) W 333543 FL2216 Fahrt Km/hr, (2) Steigh m/s Sinkt, (3) Höhe k/m w8741 F122616-6, Bauart R. Fuess Emil Scholz	600	.6
			Total µCi	2.16
			Total MBq	.08

RADIOLOGICAL SURVEY FORM

Location: NEAM

Purpose: Drum #4 Survey - Prior to Shipment to Smithsonian

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
Interior	8	41
Top Lid	ND	55
Exterior	4	ND



Comments:	Instrumentation	Key O=Smear Location, Dose Rate = mR/hr γ "X"= Fixed (CCPM/DPM)α/β			
	Make: Ludlum	Model: 3030P	Serial #: 26689	Cal Due: 09/09/14	QA Check: SAT
	Make: Ludlum	Model: 14C	Serial #: 128973	Cal Due: 10/15/14	Source Check: SAT
	Make:	Model:	Serial #:	Cal Due:	QA Check:
		Performed By D. Strickland			Date: 06/26/2014
Background (s) ND ≤ Background = β 160 DPM α 0 DPM		Reviewed By M. E. Finch			Date 7/22/14

Drum Location #	DEEP NEAM #	Description	Contact Dose Rate µR/Hr	Activity Estimate µCi
4	**018**	Localizer -T.W.A	1000	1.
4	**077**	Angle of Attack, US Navy, MAGNESYM, Type 1082-10B-2-AZ, USN BU. AERO. SPECIAL DEVICES DIV, Device RF-6, Eclipse-Pioneer Div	800	.8
4	**084**	Landing Path, Weston Electric, Model 602 Type 8	500	.5
4	**092**	Lear UCIX, Westinghouse, Syle 1205649-A	100	.1
4	**114**	Captured JAP Dual Tachometer, "Piah"	1500	1.5
4	**136**	Air Speed, Mark IVA, British Wright Co. LTP	7000	7.
4	**190**	Compass, NUR FÜR JĀGER	400	.4
4	**228**	Gas Gauge, A S Type U, National Steel Products	1000	1.
4	**234**	RPM- US NAVY, TYPE B, Victometer, JOS W. Jones	500	.5
4	**246**	Japanese Turn/Bank, Mark TA-7713, Army? TKK?	1200	1.2
4	**248**	GYRO HORIZON, AN 5736-1 A, SPERRY Gyroscope Co.	800	.8
4	**252**	Bank Climb Gyro Control, For MARK 4 Automatic Pilot, PART# 656403, cont a(s) 2905, Electric Auto-Lile Co under License from Sperry	200	.2
4	**264**	Angle of Attack Indicator, USNBU. AERO Special Devices Div Device RF-6, Type NO 10082-10B-2-A2, Bendix/Eclipse/Pioneer	700	.7
4	**287**	GRO HRZ, Navy Model 1, Tokyo Koku, Keiki KK	3000	3.

4	**291**	Radio Compass, Signal Corps U.S. Army, Compass indictor 1-65-D, Order No 1657-NY-41 Date 11/8/1940	1100	1.1
4	**294**	Turn + Bank (Japanese), Navy Model 2, Tokyo Koku ? Not sure right tag , Keiki KK.	1800	1.8
4	**297**	Directional Gyro (Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	5100	5.1
4	**298**	Directional Gyro (Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	700	.7
4	**302**	Gyro Compass (Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	3000	3.
4	**303**	Gyro Compass (Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	1600	1.6
4	**304**	Gyro Compass (Japanese), Navy Model 1, Tokyo Koku, Keiki KK.	500	.5
4	**312**	Altimeter?? Outerscale 4-16, Innerscale 16-30, Japanese	3000	3.
4	**317**	Type DJ-11 Indicator, Model 80J11 LAT, 0-360, General Electric	1000	1.
4	**350**	F-3 Altitude Gyro, SN 19 (whttag D-87), Sperry Gyroscope Co Inc	2500	2.5
4	**352**	Landing Indicator, Type CAT 22316, part of model ZA equipment, serial 2737, MFD for NAVY DEPT BUREAU of SHIPS, sub contractor Westinghouse House, Contract # 72521, 3/18/1940, Airtrack MFG Co, style 1205649, Type CAY 22316	1500	1.5
4	**375**	Localizer Or Range, Glide Path Marker, (whttag E-24), Model 888 Type 3P1, S/N 3655 CAATC # 1480, Weston Elec Inst Corp	5	.005
4	**396**	Climb Type C2, SN AC-42 Spec# 94-27957-4 Dial Hand Scratched, MP# 639k-03 Order # 26969 Indicator screwed down, Square D Co Knollsman Inst Div	25	.025
4	**403**	Altimetre Pioneer, Marque Deposee, Millliers Metres millibars, Breveté S.G.D.G, Type# 1525-3F-A-3093, Bendix N.J. USA	800	.8
4	**409**	CLIMB, 1000 Feet per min Pioneer Inst, 374-3794 Sperry	400	.4
4	**411**	Clock FLM8503-2 Luftschraube, Stellungsanzeige	300	.3

4	**412**	Bombsight? PolarGrid on see through 2, needles nahe F309 AEG Ln27002, W 47154	25	.025
4	**413**	Air Speed? 0-300 HandmadeDial, Kollsman (whttag A-68)	5	.005
4	**428**	Speedometer 0-250 Km/st, Zeiger Regulierling, UtenamApparat No 10249, Luftstrommesser Bruhn, Berlin W. Mauerstr 86-88	100	.1
4	**429**	Deuta x100 0-16 #11749 tach?, Dauta-Werke Berlin S.O. 26	200	.2
4	**438**	Switch Assembly Bombsight Control Panel, Drift Scale Light Collimator Light, AC Spark Plug Div, cont# AC-33987 Ser# AF4323309, Part# 804079 Ref 109/82	20	.02
			Total µCi	42.38
			Total MBq	1.568

BILL OF LADING – SHORT FORM – NOT NEGOTIABLE

SHIP FROM	Bill of Lading Number: CT-DEEP-05-2014
Connecticut Department of Energy and Environmental Protection **36 Perimeter Road** **Windsor Locks, CT**	
SHIP TO	**Carrier Name: Yellow Freight**
Smithsonian Institution **National Air and Space Museum** **Paul E. Garber Facility, Building 10** **3904 Old Silver Hill Road** **Suitland, Maryland** **20746-3190** ***Attention: Sam Dargan/ David Peters***	PRO. # 947-518321-X
Special Instructions: ***Emergency Response Telephone Number 860-424-3333***	CT DEEP USNRC License Number: 06-27895-02 Smithsonian Institution National Air and Space Museum USNRC License: 08-05938-13
Invoicee: Smithsonian Institution National Air and Space Museum 6th & Independence Avenue, SW Room 33112 Attention: Ms Collette Williams Washington, DC 20560-0312 **Special Instructions: GOVERNMENT TENDER G3020**	

CARRIER INFORMATION

		Package						
		Qty	Type	Weight	HM (X)	**Commodity Description** Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation with ordinary care. See Section 2(e) of NMFC item 360		Class
		1	55 Gallon Drum	150 lbs.	X	NEAM Drum # 1 UN2915, Radioactive Material		7
						Type A Package -7		
						Ra-226, Solid Metal Oxides, 1.49 MBq's (0.0403 milliCuries)		
						Radioactive Yellow II, T.I. 0.1		
						Seal Number: 0959230		
		1	55 Gallon Drum	50 lbs.	X	**Commodity Description** NEAM Drum # 2 UN2915, Radioactive Material Type A Package- 7 Ra-226, Solid Metal Oxides, 0.007 MBq's (0.000189 milliCuries) Radioactive White I		7
						Seal Number: 0959228		

		Package						
		Qty	Type	Weight	HM (X)	**Commodity Description** Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation with ordinary care. See Section 2(e) of NMFC item 360		Class
		1	55 Gallon Drum	90 lbs.	X	NEAM Drum # 3 UN2915, Radioactive Material		7
						Type A Package 7		
						Ra-226, Solid Metal Oxides, 0.08 MBq's (0.0022 millicuries)		
						Radioactive White I, Seal Number: 0959943		
		Qty	Type	Weight	HM (X)	**Commodity Description**		Class
		1	55 Gallon Drum	150 lbs.	X	NEAM Drum #4 UN2915, Radioactive Material Type A Package 7 Ra-226, Solid Metal Oxides, 1.57 MBq's 9 (0.0424) milliCuries) Radioactive Yellow II, T.I. 0.1 Seal Number: 0959227		7

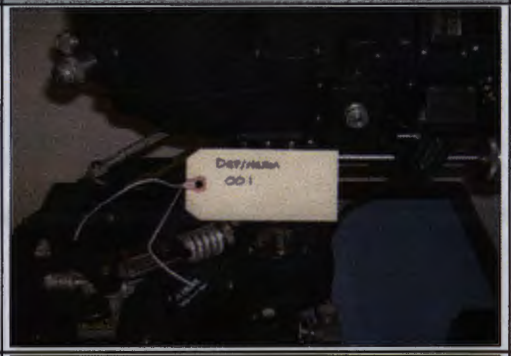
Note: Liability limitation for loss or damage in this shipment may be applicable. See 49 USC § 14706(c)(1)(A) and (B).

Shipper Signature/Date _Michel E. Firsick, R.S.O. _____ This is to certify that the above named materials are properly classified, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the DOT.	Trailer Loaded: (•) By shipper ( ) By driver	Freight Counted: ( ) By shipper ( ) By driver/pallets said to contain ( ) By driver/pieces	**Carrier Signature/Date** _____ Carrier acknowledges receipt of packages and required placards. Carrier certifies emergency response information was made available and/or carrier has the DOT emergency response guidebook or equivalent documentation in the vehicle. Property described above is received in good order, except as noted.

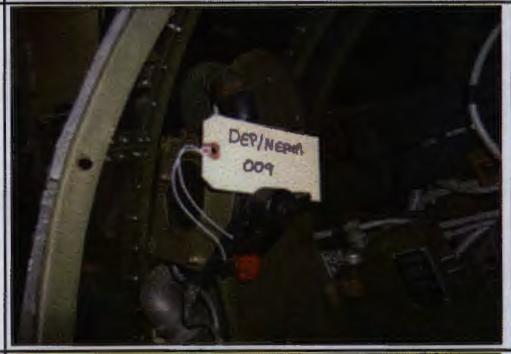
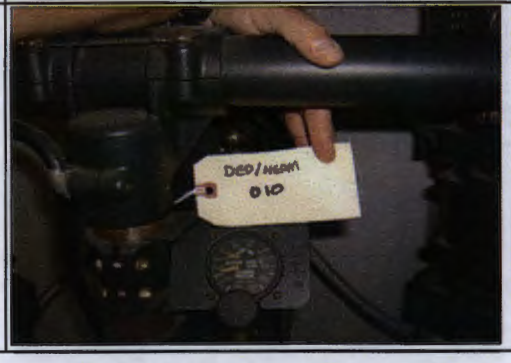
I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labeled/placarded and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

ATTACHMENT 3

Device Inventory

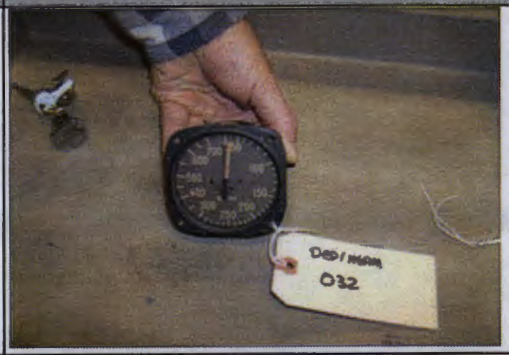
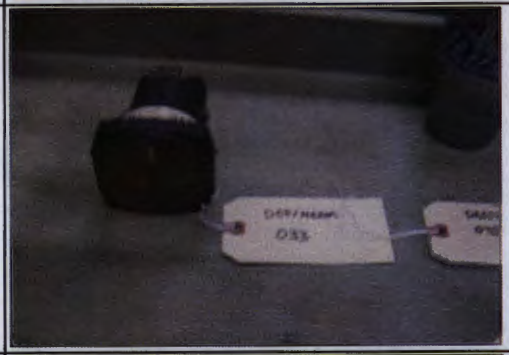
DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
001		Nordin Bombsight	Yes	NEAM Front Lobby	7	.007	NEAM 001.jpg
002		O2 Tank	Yes	NEAM Flying Tigers Room On Top of Hell's Angel Shelf	50	.05	NEAM 002.jpg
003		Bombsight (Circa 1920)	Yes	NEAM Military Wing Display Case	120	.12	NEAM 003.jpg

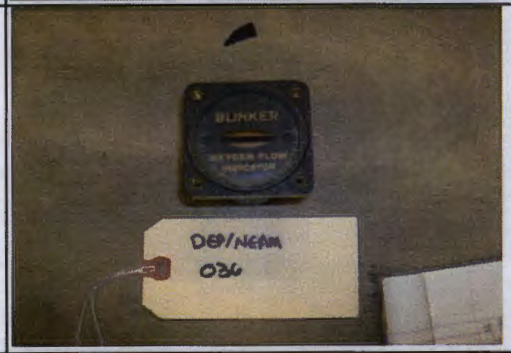
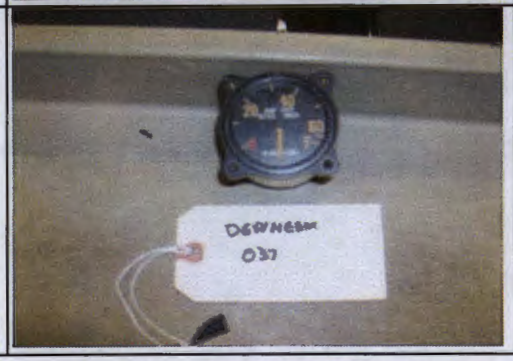
DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
005		Aircraft Octent	Yes	NEAM Military Wing Display Case	3500	3.5	NEAM 005.jpg
006		Sextant	Yes	NEAM Military Wing Display Case	400	.4	NEAM 006.jpg
007		Astro Nav Compass	Yes	NEAM Military Wing Display Case	400	.4	NEAM 007.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
008		Astro Compass	Yes	NEAM Military Wing Display Case	45	.045	NEAM 008.jpg
009		Grumman Nose Turret Emergency Switch near O2 Hose	Yes	NEMA B-29 Wing	200	.2	NEAM 009.jpg
010		Cylinder Pressure Gauge	Yes	Storage	200	.2	NEAM 010.jpg

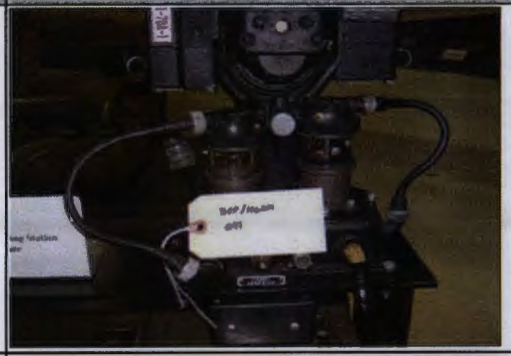
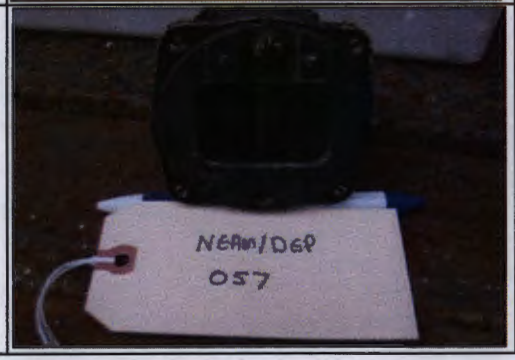
DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
013		Remote Instrument	Yes	Storage Hangar	1300	1.3	NEAM 013.jpg
014		Radio Compass with Link Flying Trainer Type ANT-18	Yes	Storage Hangar	100	.1	NEAM 014.jpg
017		O2 Register - Serial AF44-25493	Yes	Storage	10	.01	NEAM 017.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
021		Astro Compass MKII	Yes	Storage	35	.035	NEAM 021.jpg
027		O2 Regulator	Yes	Storage	10	.01	NEAM 027.jpg
031		FP4 Panther Control Panel	Yes	Storage	500	.5	NEAM 031.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
032		Air Speed Indicator - "Square D"	Yes	Flying Tigers Room	2000	2.	NEAM 032.jpg
033		Turn/Bank Indicator	Yes	Flying Tigers Room	9000	9.	NEAM 033.jpg
034		P-40 Instrument Panel	Yes	Flying Tigers Room	3500	3.5	NEAM 034.jpg

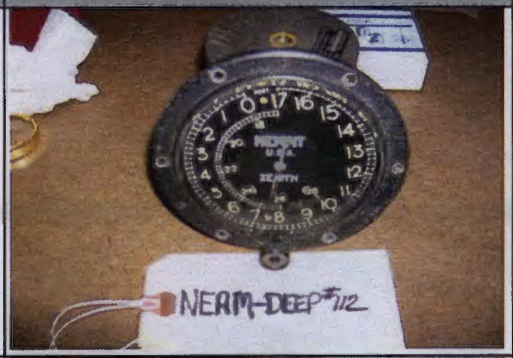
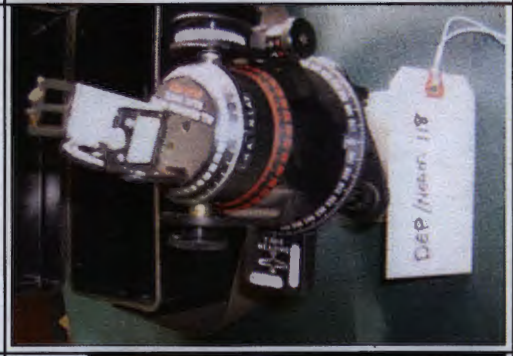
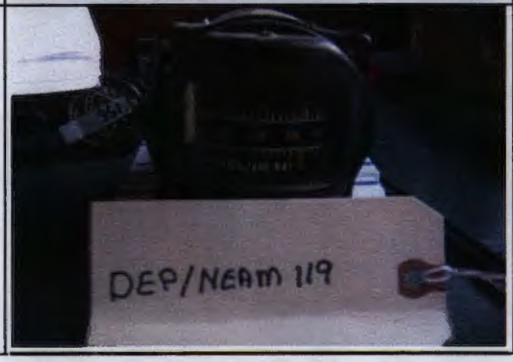
DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
035		Oxygen Cylinder Pressure Gauge	Yes	Flying Tigers Room	1500	1.5	NEAM 035.jpg
036		Blinker O2 Flow Indicator	Yes	Flying Tigers Room	2000	2.	NEAM 036.jpg
037		P-40 Fuel Indicator	Yes	Flying Tigers Room	1000	1.	NEAM 037.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
038		Bendix Aviation Compass	Yes	Flying Tigers Room	800	.8	NEAM 038.jpg
039		Control Panel - Nicholas Beazley Airplane Company	No	NEAM Civilian Aviation Hanger Mail Display Case	15	.015	NEAM 039.jpg
040		Astro Compass	Yes	NEAM B-29 Wing Display Case	100	.1	NEAM 040.jpg

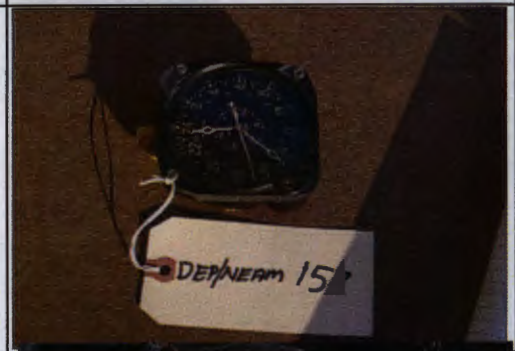
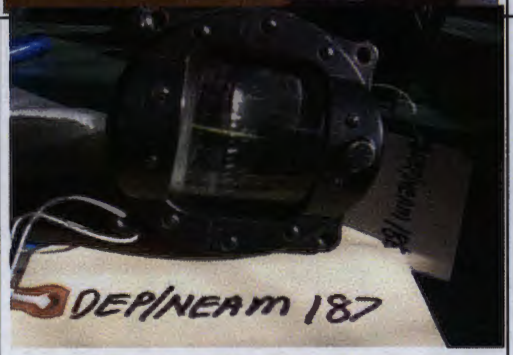
DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
041		B-29 Gunsight Switch	Yes	NEAM B-29 Wing	300	.3	NEAM 041.jpg
043		Life Raft	Yes	NEAM B-29 Wing	40	.04	NEAM 043.jpg
057		Compass, No ID Info		Storage	300	.3	NEAM 057.jpg

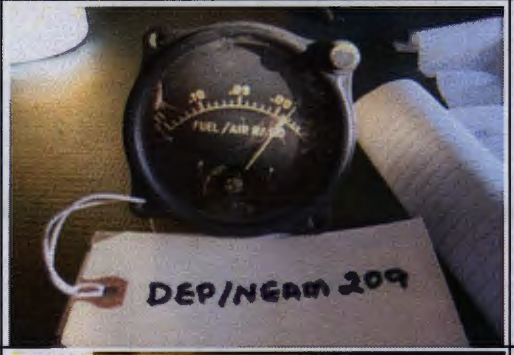
DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
066		Sextant Bubble Type in Case, Bendix Aviation, Serial #AF-42-12553	Yes	Storage	1200	1.2	NEAM 066.jpg
067		Pioneer Compass Generator, A.C. USARMY	Yes	Storage	200	.2	NEAM 067.jpg
074		Blinker Oxygen Flow , Oxygen Cyl Press, DELCO Radio, Clap Instrument Co. AN-6021-1A		Storage	200	.2	NEAM 074.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
080		Amps/Volts Model 506		Storage	800	.8	NEAM 080.jpg
088		Altitude Pioneer, Type 1528-2E-8		Storage	1400	1.4	NEAM 088.jpg
097		Multi Gauge, General Electric, Fuel, Main L H, Main R H		Storage	700	.7	NEAM 097.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
112		Height, Zenith 1533USA		NEAM Sealand Container	170	.17	NEAM 112.jpg
118		Astr Compass MKII (with case), W.W. Boes Co.		NEAM Sealand Container	200	.2	NEAM 118.jpg
119		Fuel/Air Ratio, Cambridge Instrument co., A.C. US Army, Type B-6	Yes	NEAM Sealand Container	250	.25	NEAM 119.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
125		Flight Indicator, Pioneer Instrument Company, Bank + Pitch, Part 07409, A.C USARMY Type A-4	Yes	Storage	800	.8	NEAM 125.jpg
151		Compass, AF US ARMY Type D-12, Part No 1801.1.A.V.A, Spec No 94-27825, Victor _oding Machine Company	Yes	Storage	2000	2.	NEAM 151.jpg
152		Compass, AC USARMY, Type D-12, MFRS Part No 1801.1.1.A, Spec No 94-27825	Yes	Storage	1600	1.6	NEAM 152.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
154		Indicator Oil Quantity, EA48-16, MFRS Part EA-48-16, Contract AC-19673, The Liquid Meter Corp.		Storage	30	.03	NEAM 154.jpg
157		Clock-Waltham, FSS#88 C 590, Part #CDIA, US NAVY	Yes	Storage	50	.05	NEAM 157.jpg
187		Compass, Kollsman, Type 58 BL, Poly Plane Compensator		Storage	200	.2	NEAM 187.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
209		Fuel Air Ratio, A.C. US ARMY, Type A2, Breeze Corp, M Part # H-126-8-10, Spec # 27845	Yes	Storage	150	.15	NEAM 209.jpg
210		Fuel Air Ratio, Breeze Corp, M Part # H-126-8-10, Spec # 27845, A.C. US ARMY, Type A2	Yes	Storage	100	.1	NEAM 210.jpg
236		Aircraft Automatic Pilot, Type A-3A JH 6000, Bank Climb Gyro JH6110		Storage	500	.5	NEAM 236.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
254		Hydraulic Pressure Gauge, US Gauge Company, Part AW 1 7/8 17 AV		Storage	100	.1	NEAM 254.jpg
308		Control bank and Climb, Type3A Aircraft Automatic Pilot, Air Forces United State Army, W33-038-AC4341, Jack+Heintz Inc.	Yes	Storage	1100	1.1	NEAM 308.jpg
332		17 Gauge Consul w 4 Warning Lights, 7 Gauges Installed, Label BU NO 130063, Whitetag RASEKI HOP 2 INSTR PNL, (1) Knots Airspeed Aerosonic Corp, MS 28045, FSN RM6610-526-4397 V170, Contract No N383 747872A, (2)MAN, AN 5770-1 MP# 6748 180, contract # NOA(s) 346, (3) Turn Bank Burton Manuf, AN 2850T1, MP#9pioneer0 1721-2U-A2T, Contract W33-038 AC8435,		Storage	5000	5.	NEAM 332.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
360		Bank Climb Gyro Control, For S-3 Automatic Pilot, BU of AERO U.S. Navy, F.S.S.C #88-U-110-10, Cont # No(?) 3064	Yes	Storage	5	.005	NEAM 360.jpg
361		Control Directional Gyro, Type A-3A Aircraft Auto Pilot, Air force United States Army, Spec # 94-27978, Ord# W33-038-AC-4341, S/N AF 45-35117, (whttag D-144)	Yes	Storage	5	.005	NEAM 361.jpg
369		Mark III Automatic Pilot. BU. of Aero U.S. Navy FSSC# R-88-U-110-10, Part # 643916 Cont# a(s) 2327, serial ???, Bank Climb Gyro Control	Yes	Storage			NEAM 369.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
408		Portable Altitude Gauge, Mounted in box Knollsman, SN A6 US Army Part # 371k-05, (wht tag# A196) spec# 94-27955, Square D Company		Storage	400	.4	NEAM 408.jpg
423		Automatic Astro Compass, Knollsman Type AF Type KS-50-03, White panels 1 says declination are hot		Storage	200	.2	NEAM 423.jpg
437		3 Gauge Assemble, Directional Gyro, Gryo Horizon, InHg, whitetag D142		Storage	1200	1.2	NEAM 437.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
A3 Sextant		A3 Sextant		Storage			A3Sextant.jpg
A1		Radio Compass for Burnelli, Signal Corps 662-01-254		Storage	1250	1.25	NEAM-A1.jpg
A2		Japanese Altimeter		Storage			NEAM-A2.jpg

DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
A3		Japanese Bank Climb		Storage			NEAM-A3.jpg
A4		Altimeter, AN 5760-2, Square D		Storage			NEAM-A4.jpg

ATTACHMENT 4

NRC letter to Rear Admiral Baffer of the US Coast Guard from Blake Welling, Docket No., 99990001 dated May 8, 2017

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713

May 8, 2017

EA-17- 037

Bruce Baffer
Rear Admiral
United States Coast Guard
Department of Homeland Security
2703 Martin Luther King Jr. Avenue, SE
Washington, DC 20593-7000

SUBJECT: NRC SPECIAL INSPECTION REPORT NO. 99990001/2015001, UNITED STATES COAST GUARD, AND NOTICE OF VIOLATION

Dear Admiral Baffer,

This letter refers to the special inspection conducted from May 26, 2015, through April 26, 2017, of US Coast Guard (USCG) activities authorized by the General License described in 10 CFR 31.5, as they relate to radiation safety and to compliance with the Commission's rules and regulations.

Background

On June 2, 2014, a representative from the Connecticut Department of Energy and Environmental Protection (CT DEEP) notified NRC Region I that a former USCG helicopter, an "H-52A Seaguard" on display at the New England Air Museum (NEAM), Windsor Locks, CT, was found to have three 100 microcurie Sr-90 radioactive sources installed in devices mounted on the helicopter rotor blades. Following the discovery of the devices on the helicopter, the NRC responded to the NEAM on June 9, 2014, to review the information provided by CT DEEP. That inspection confirmed the presence of In-Flight Blade Inspection System (IBIS) devices installed on the helicopter, which are subject to the General License requirements contained in 10 CFR Part 31.5. NEAM determined that it owned the H-52A helicopter on display, having obtained it in a transfer from the USCG on or about May 30, 1989. NEAM staff were not aware that the helicopter had Sr-90 General License devices installed until informed by CT DEEP personnel on June 2, 2014.

USCG initiated an investigation to determine how the devices had been transferred to the NEAM, and also to determine the extent of the condition. USCG subsequently confirmed the presence of IBIS devices on five additional helicopters in New Jersey, Pennsylvania, California, and Oregon. USCG safely removed the IBIS devices from the NEAM on March 17, 2015, and has since removed the IBIS devices from four additional helicopters. USCG is taking action to properly transfer or remove the IBIS from the one remaining helicopter.

Results

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The violation was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at (http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html). The violation involved

the failure to transfer or dispose of devices containing byproduct material only by the authorized means specified in 10 CFR 31.5(c)(8)(i). The violation is cited in the enclosed Notice of Violation because it was identified by the NRC.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC review of your response to the Notice will also determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

If you have any questions regarding this matter, please contact Todd Jackson of my staff at 610-337-5308 or via electronic mail Todd.Jackson@nrc.gov.

Thank you for your cooperation.

Sincerely,

Blake D. Welling, Chief
Commercial, Industrial, R&D
and Academic Branch
Division of Nuclear Materials Safety

Docket No. 99990001

Enclosures:
1. Notice of Violation
2. Inspection Report 99990001/2015001

cc w/encls: CAPT Randall Hartnett, USCG
LCDR Andrew Schanno, USCG
State of California
State of Connecticut
State of New Jersey
State of Oregon
Commonwealth of Pennsylvania

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Docket No. 99990001
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1. Notice of Violation
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cc w/encls: CAPT Randall Hartnett, USCG
LCDR Andrew Schanno, USCG
State of California
State of Connecticut
State of New Jersey
State of Oregon
Commonwealth of Pennsylvania

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NAME	TJackson		MMcLaughlin		BWelling			
DATE	5/3/17		5/4/17		5/8/17			

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NOTICE OF VIOLATION

United States Coast Guard
Washington, DC

Docket No. 99990001
EA-17-037

During an inspection conducted from May 26, 2015 to April 26, 2017, one violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

> 10 CFR 31.5(c)(8)(i) requires, in part, that any person who acquires, receives, possesses, uses or transfers byproduct material in a device pursuant to the general license, shall transfer or dispose of the device containing byproduct material only by export as provided by paragraph (c)(7) of this section, by transfer to another general licensee as authorized in paragraph (c)(9) of this section, or to a person authorized to receive the device by a specific license issued under parts 30 and 32 of this chapter, or part 30 of this chapter that authorizes waste collection, or equivalent regulations of an Agreement State, or as otherwise approved under paragraph (c)(8)(iii) of this section.
>
> Contrary to the above, the US Coast Guard (USCG) failed to transfer or dispose of devices containing byproduct material only by the authorized means specified in 10 CFR 31.5(c)(8)(i). Specifically, at various times after August 5, 1977, and prior to June 2, 2014, the USCG improperly transferred one HH-3F and five HH-52A helicopters with an installed total of 20 General License In-Flight Blade Inspection System (IBIS) devices to others who were not authorized to receive those devices. These transfers by the US Coast Guard resulted in possession of the devices by six recipients not authorized to possess byproduct material under the NRC General License in Connecticut (1), New Jersey (1), Pennsylvania (2), California (1), and Oregon (1).
>
> This is a Severity Level IV violation (Enforcement Policy Section 6.7)

Pursuant to the provisions of 10 CFR 2.201, the United States Coast Guard is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, Region I, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or if contested, the basis for disputing the violation or severity level; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken; and (4) the date when full compliance was or will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time. Your response to this Notice will be made available electronically for public inspection in the NRC's Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC's website at http://www.nrc.gov/reading-rm/adams.html. To the extent

possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made publicly available without redaction.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 8th day of May 2017

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Inspection No.	99990001/2015001
Docket No.	99990001
License No.	General License
EA No.	EA-17-037
Licensee:	United States Coast Guard
Location:	Headquarters, United States Coast Guard Department of Homeland Security 2703 Martin Luther King Jr. Avenue, SE Washington, DC 20593-7000
Inspection Dates:	May 26, 2015, through April 26, 2017

Inspectors:

Todd Jackson — May 8, 2017
Date

Senior Health Physicist
Commercial, Industrial, R&D and Academic Branch
Division of Nuclear Materials Safety

Approved By:

Blake Welling, Chief — 5/8/2017
Date

Commercial, Industrial, R&D and Academic Branch
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

United States Coast Guard
NRC Inspection Report No. 99990001/2015001

The US Coast Guard (USCG) operated two helicopter models, HH-52A and HH-3F, which had strontium-90 (Sr-90) sources installed in devices on the helicopter rotor blades. This NRC inspection was a focused evaluation of efforts by the USCG to determine how many former USCG helicopters had been transferred out of USCG control with the In-Flight Blade Inspection System (IBIS) containing Sr-90 installed on the aircraft, and to safely remove or properly transfer those sources identified.

An HH-52A helicopter with IBIS Sr-90 devices installed was discovered by the Connecticut Department of Energy and Environmental Protection on display at a public museum in Connecticut in June 2014. From approximately August 5, 1977, through October 3, 1983, the USCG obtained 99 HH-52A and 50 HH-3F helicopters incorporating up to 556 General License IBIS devices and few records existed to demonstrate these devices were properly transferred from USCG control or disposed.

The USCG removed the IBIS devices discovered on the HH-52A at the museum in Connecticut and initiated an investigation to determine the extent of the condition and whether additional helicopters had been transferred to others with IBIS devices still installed. USCG identified five additional helicopters with IBIS devices in New Jersey, Pennsylvania, California, and Oregon. The USCG investigation also determined that 64 helicopters did not have IBIS installed, 40 appeared to have been subjected to proper demilitarization procedures and would have had IBIS removed during that process, 30 were lost through crashes or other known mechanisms of destruction, and 9 were identified for which no information could be found.

The NRC identified a Severity Level IV violation of 10 CFR 31.5(c)(8)(i) involving the failure to properly transfer general license devices to other owners. The USCG has safely removed IBIS devices and Sr-90 sources from five of the six identified privately-owned former USCG helicopters, and actions are progressing to properly transfer or remove the IBIS from the one remaining helicopter with IBIS installed.

REPORT DETAILS

I. Program Overview and Background

On June 2, 2014, a representative from the Connecticut Department of Energy and Environmental Protection (CT DEEP) notified NRC Region I that an "H-52A Seaguard" helicopter on display at the New England Air Museum (NEAM), Windsor Locks, CT, had three strontium-90 (Sr-90) radioactive sources installed in devices mounted on the aircraft rotor blades. The NRC responded to the NEAM to review the information provided by CT DEEP and confirmed the presence of installed In-Flight Blade Inspection System (IBIS) devices on the helicopter which are subject to the General License requirements contained in 10 CFR Part 31.5. NEAM determined that it owned the H-52A helicopter on display, having obtained it in a transfer from the US Coast Guard (USCG) on or about May 30, 1989. Although identified as a Model "H-52A", the displayed helicopter is apparently a Model HH-52A, based on information provided by the aircraft manufacturer and the USCG. NEAM was not aware that the helicopter had Sr-90 General License devices installed until informed by CT DEEP personnel on June 2, 2014.

IBIS devices used by the USCG each incorporated 100 microcuries of Sr-90, and were manufactured and supplied by General Nucleonics Corporation of Pomona, CA, from approximately August 5, 1977 through October 3, 1983. The IBIS devices were installed on HH-52A and HH-3F model helicopters for the USCG by the helicopter manufacturer, Sikorsky Aircraft Corporation. Sikorsky built 99 versions of the HH-52A for USCG, and each helicopter had one IBIS device installed on each of three rotor blades, resulting in a total of up to 297 IBIS devices installed on HH-52A helicopters. Sikorsky also built 50 Model HH-3F helicopters procured by the USCG, with one IBIS device installed on each of five rotor blades, resulting in a total of up to 250 IBIS devices. Spare blades were also obtained by USCG with IBIS devices installed on them. USCG returned nine of these spares to General Nucleonics in 2015 for disposal, although the total number of spare blades procured is not known. Sikorsky confirmed that IBIS devices were installed only on Models HH-3F and HH-52A for the USCG, and USCG no longer operates any of these helicopters. The USCG was informed by General Nucleonics that records were confirmed for 330 IBIS devices transferred to USCG, and USCG noted that some HH-52A and HH-3F helicopters had been identified with a system installed similar to IBIS but that did not use or contain any radioactive material. It is therefore concluded that the total number of IBIS containing Sr-90 devices installed in USCG helicopters was at least 330 and could have been as many as 547.

General Nucleonics manufactured the IBIS under California Department of Public Health License No. 3138-70 GL and transferred the devices to the USCG as General License devices to be possessed and used by the USCG in accordance with regulatory requirements in 10 CFR 31.5. The manufacturer's detailed description of the device is contained in Sealed Source and Device Registration No. CA-321-D-103G, dated January 27, 1977.

II. Investigation of Status of US Coast Guard Devices

a. Inspection Scope

The USCG operated two helicopter models, HH-52A and HH-3F, which had Sr-90 sources installed in devices on the helicopter rotor blades. This NRC inspection was a focused evaluation of efforts by the USCG to determine how many former USCG helicopters had been transferred out of USCG control with the IBIS containing Sr-90 installed on the aircraft, and to safely remove or properly transfer those sources identified. The NRC first informed the USCG in July 2014 that IBIS devices had been identified as being installed on one HH-52A helicopter on display at the NEAM, and it was not known at that time if other helicopters with IBIS devices were accessible to the public.

b. Observations and Findings

Once the USCG became aware of the three IBIS devices at the NEAM, they initiated an investigation to determine the status of as many as possible of the remaining HH-52A and HH-3F helicopters and whether they had IBIS devices installed, as well as to determine whether any additional IBIS devices remained in USCG spare parts inventory. The USCG based the investigation on available USCG records in combination with a publicly-available database at www.helis.com to define the baseline for the scope of the investigation into current status of helicopters formerly operated by the USCG. The number of helicopters included in the USCG investigation is shown in the following table:

Maximum number of IBIS devices installed in US Coast Guard Helicopters

	Number of helicopters	IBIS Devices (blades) per helicopter	Total potential IBIS Devices
HH-52	99	3	297
HH-3F	50	5	250
Known spares (properly transferred from inventory)	9 spare blades	1	9
TOTAL IBIS			556

As a result of the investigation, USCG discovered five additional privately-owned former USCG helicopters with IBIS devices installed. USCG took action to safely remove and transfer the identified IBIS devices. As of April 26, 2017, one remaining HH-52A in California had IBIS devices installed which were not yet transferred or disposed. The USCG agreed to report to NRC when that transfer or removal is completed, and USCG

anticipated this will occur within a few months. The remaining three IBIS devices are being adequately controlled until they can be transferred or removed.

USCG determined the status of as many helicopters as could be found, with the results summarized in the table below. The category identified as "AMARC" references the military procedure intended to assure that hazardous materials, including radioactive materials, were removed prior to transferring the helicopter from US Government control. AMARC refers to what was the 309th Aircraft Maintenance and Regeneration Center which processed the retired aircraft. USCG determined that helicopters for which AMARC records existed were found to no longer have IBIS devices, and therefore USCG concluded that AMARC records reliably indicated correct removal of IBIS. However, AMARC records were not identified for all helicopters and it USCG has concluded that not all helicopters were processed through the AMARC system.

The category identified as "struck" indicates that the helicopter was lost or destroyed, either in a crash or through some other mechanism, and no other information could be identified.

SUMMARY OF US COAST GUARD INVESTIGATION FINDINGS: NUMBERS OF HELICOPTERS:

	HH-52	HH-3F	Number of helicopters
IBIS devices confirmed to be present/ have been removed	4	1	5
IBIS devices confirmed to be present/ not yet removed	1	0	0
"Cleared"(Verified No IBIS devices)	45	19	64
AMARC (records identified showing processed per demilitarization procedures)	14	26	40
Partial information/ no record of AMARC	7	0	7
Unknown / No Information	1	1	2
Struck (Crashed or otherwise destroyed)	27	3	30
TOTAL HELICOPTERS	99	50	149

c. Conclusions

One Severity Level IV violation of 10 CFR 31.5(c)(8) was identified.

The USCG obtained the IBIS devices, each containing 100 microcuries Sr-90, from General Nucleonics during the period of August 5, 1977 through October 3, 1983. The IBIS devices were manufactured and initially transferred by General Nucleonics in accordance with License No. 3138-70 GL issued by the State of California, Department of Public Health, under regulations equivalent to the NRC regulations in 10 CFR 32.51

and 10 CFR 31.5(b). The IBIS devices possessed by USCG are therefore subject to the General License described in 10 CFR 31.5. The USCG currently does not possess or operate any helicopters which have the IBIS devices installed.

10 CFR 31.5(c)(8)(i) requires, in part, that any person who acquires, receives, possesses, uses or transfers byproduct material in a device pursuant to the general license, shall transfer or dispose of the device containing byproduct material only by export as provided by paragraph (c)(7) of this section, by transfer to another general licensee as authorized in paragraph (c)(9) of this section, or to a person authorized to receive the device by a specific license issued under parts 30 and 32 of this chapter, or part 30 of this chapter that authorizes waste collection, or equivalent regulations of an Agreement State, or as otherwise approved under paragraph (c)(8)(iii) of this section.

Contrary to the above, the USCG failed to transfer or dispose of devices containing byproduct material only by the authorized means specified in 10 CFR 31.5(c)(8)(i). Specifically, at various times after August 5, 1977, and prior to June 2, 2014, the USCG improperly transferred one HH-3F and five HH-52A helicopters with an installed total of 20 General License IBIS devices to others who were not authorized to receive those devices. These transfers by USCG resulted in possession of the devices by six recipients not authorized to possess byproduct material under the NRC General License in Connecticut (1), New Jersey (1), Pennsylvania (2), California (1), and Oregon (1).

The USCG made extensive efforts to determine the location and status of the remaining former USCG helicopters and to assure that no General License IBIS devices remained uncontrolled. The investigation identified five additional helicopters with IBIS devices installed, and was effective in determining current status of as many helicopters and IBIS as possible considering the significant elapsed time since USCG physically transferred these helicopters out of USCG control. In March 2015, the USCG took action to safely remove the IBIS devices identified as still-installed on the HH-52A at the NEAM. The USCG subsequently also removed IBIS devices from helicopters in Teterboro, NJ; West Chester, PA; Reading, PA; and White City, OR, and transferred them to the manufacturer for disposal. As of April 26, 2017, USCG was working to properly transfer possession of the IBIS devices to the current helicopter owner located in Riverside, CA. USCG has committed to inform NRC when the transfer of the general license for the three IBIS devices on the HH-52 helicopter is completed, and to report the transfers in accordance with the requirements of 10 CFR 31.5(c)(8)(ii).

Following the determination of the final disposition of as many IBIS devices as possible during its investigation, USCG made a telephone report (Event Report No. 52684) to the NRC Headquarters Operations Officer on April 17, 2017, as required by 10 CFR 20.2201(a)(i). USCG indicated the written follow-up report required by 10 CFR 20.2201(b) would be submitted as required, and is due on May 17, 2017.

III. Exit Meeting

The inspector discussed the conclusions described in this report with LDCR Andrew Schanno, USCG, during an exit meeting conducted by telephone on April 26, 2017.

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

US Coast Guard

CAPT R. Hartnett
LCDR A. Schanno
CWO R. Fielder
T. J. Granito
F. Esposito
R. Lipinski

INSPECTION PROCEDURES USED

87103 Inspection of Material Licensees Involved in an Incident or Bankruptcy

LIST OF DOCUMENTS REVIEWED

Sealed Source and Device Registration No. CA-321-D-103G, dated January 27, 1977
California Department of Public Health License No. 3138-70 GL
NMED Item 170198

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713

May 8, 2017

EA-17- 037

Bruce Baffer
Rear Admiral
United States Coast Guard
Department of Homeland Security
2703 Martin Luther King Jr. Avenue, SE
Washington, DC 20593-7000

SUBJECT: NRC SPECIAL INSPECTION REPORT NO. 99990001/2015001, UNITED STATES COAST GUARD, AND NOTICE OF VIOLATION

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Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The violation was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at (http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html). The violation involved

the failure to transfer or dispose of devices containing byproduct material only by the authorized means specified in 10 CFR 31.5(c)(8)(i). The violation is cited in the enclosed Notice of Violation because it was identified by the NRC.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC review of your response to the Notice will also determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

If you have any questions regarding this matter, please contact Todd Jackson of my staff at 610-337-5308 or via electronic mail Todd.Jackson@nrc.gov.

Thank you for your cooperation.

Sincerely,

Blake D. Welling, Chief
Commercial, Industrial, R&D
and Academic Branch
Division of Nuclear Materials Safety

Docket No. 99990001

Enclosures:
1. Notice of Violation
2. Inspection Report 99990001/2015001

cc w/encls: CAPT Randall Hartnett, USCG
LCDR Andrew Schanno, USCG
State of California
State of Connecticut
State of New Jersey
State of Oregon
Commonwealth of Pennsylvania

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cc w/encls: CAPT Randall Hartnett, USCG
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State of California
State of Connecticut
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DATE	5/3/17		5/4/17		5/8/17			

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NOTICE OF VIOLATION

United States Coast Guard
Washington, DC

Docket No. 99990001
EA-17-037

During an inspection conducted from May 26, 2015 to April 26, 2017, one violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

> 10 CFR 31.5(c)(8)(i) requires, in part, that any person who acquires, receives, possesses, uses or transfers byproduct material in a device pursuant to the general license, shall transfer or dispose of the device containing byproduct material only by export as provided by paragraph (c)(7) of this section, by transfer to another general licensee as authorized in paragraph (c)(9) of this section, or to a person authorized to receive the device by a specific license issued under parts 30 and 32 of this chapter, or part 30 of this chapter that authorizes waste collection, or equivalent regulations of an Agreement State, or as otherwise approved under paragraph (c)(8)(iii) of this section.
>
> Contrary to the above, the US Coast Guard (USCG) failed to transfer or dispose of devices containing byproduct material only by the authorized means specified in 10 CFR 31.5(c)(8)(i). Specifically, at various times after August 5, 1977, and prior to June 2, 2014, the USCG improperly transferred one HH-3F and five HH-52A helicopters with an installed total of 20 General License In-Flight Blade Inspection System (IBIS) devices to others who were not authorized to receive those devices. These transfers by the US Coast Guard resulted in possession of the devices by six recipients not authorized to possess byproduct material under the NRC General License in Connecticut (1), New Jersey (1), Pennsylvania (2), California (1), and Oregon (1).
>
> This is a Severity Level IV violation (Enforcement Policy Section 6.7)

Pursuant to the provisions of 10 CFR 2.201, the United States Coast Guard is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, Region I, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or if contested, the basis for disputing the violation or severity level; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken; and (4) the date when full compliance was or will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time. Your response to this Notice will be made available electronically for public inspection in the NRC's Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC's website at http://www.nrc.gov/reading-rm/adams.html. To the extent

possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made publicly available without redaction.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 8th day of May 2017

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Inspection No.	99990001/2015001
Docket No.	99990001
License No.	General License
EA No.	EA-17-037
Licensee:	United States Coast Guard
Location:	Headquarters, United States Coast Guard Department of Homeland Security 2703 Martin Luther King Jr. Avenue, SE Washington, DC 20593-7000
Inspection Dates:	May 26, 2015, through April 26, 2017

Inspectors:

Todd Jackson — May 8, 2017
Date

Senior Health Physicist
Commercial, Industrial, R&D and Academic Branch
Division of Nuclear Materials Safety

Approved By:

Blake Welling, Chief — 5/8/2017
Date

Commercial, Industrial, R&D and Academic Branch
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

United States Coast Guard
NRC Inspection Report No. 99990001/2015001

The US Coast Guard (USCG) operated two helicopter models, HH-52A and HH-3F, which had strontium-90 (Sr-90) sources installed in devices on the helicopter rotor blades. This NRC inspection was a focused evaluation of efforts by the USCG to determine how many former USCG helicopters had been transferred out of USCG control with the In-Flight Blade Inspection System (IBIS) containing Sr-90 installed on the aircraft, and to safely remove or properly transfer those sources identified.

An HH-52A helicopter with IBIS Sr-90 devices installed was discovered by the Connecticut Department of Energy and Environmental Protection on display at a public museum in Connecticut in June 2014. From approximately August 5, 1977, through October 3, 1983, the USCG obtained 99 HH-52A and 50 HH-3F helicopters incorporating up to 556 General License IBIS devices and few records existed to demonstrate these devices were properly transferred from USCG control or disposed.

The USCG removed the IBIS devices discovered on the HH-52A at the museum in Connecticut and initiated an investigation to determine the extent of the condition and whether additional helicopters had been transferred to others with IBIS devices still installed. USCG identified five additional helicopters with IBIS devices in New Jersey, Pennsylvania, California, and Oregon. The USCG investigation also determined that 64 helicopters did not have IBIS installed, 40 appeared to have been subjected to proper demilitarization procedures and would have had IBIS removed during that process, 30 were lost through crashes or other known mechanisms of destruction, and 9 were identified for which no information could be found.

The NRC identified a Severity Level IV violation of 10 CFR 31.5(c)(8)(i) involving the failure to properly transfer general license devices to other owners. The USCG has safely removed IBIS devices and Sr-90 sources from five of the six identified privately-owned former USCG helicopters, and actions are progressing to properly transfer or remove the IBIS from the one remaining helicopter with IBIS installed.

REPORT DETAILS

I. Program Overview and Background

On June 2, 2014, a representative from the Connecticut Department of Energy and Environmental Protection (CT DEEP) notified NRC Region I that an "H-52A Seaguard" helicopter on display at the New England Air Museum (NEAM), Windsor Locks, CT, had three strontium-90 (Sr-90) radioactive sources installed in devices mounted on the aircraft rotor blades. The NRC responded to the NEAM to review the information provided by CT DEEP and confirmed the presence of installed In-Flight Blade Inspection System (IBIS) devices on the helicopter which are subject to the General License requirements contained in 10 CFR Part 31.5. NEAM determined that it owned the H-52A helicopter on display, having obtained it in a transfer from the US Coast Guard (USCG) on or about May 30, 1989. Although identified as a Model "H-52A", the displayed helicopter is apparently a Model HH-52A, based on information provided by the aircraft manufacturer and the USCG. NEAM was not aware that the helicopter had Sr-90 General License devices installed until informed by CT DEEP personnel on June 2, 2014.

IBIS devices used by the USCG each incorporated 100 microcuries of Sr-90, and were manufactured and supplied by General Nucleonics Corporation of Pomona, CA, from approximately August 5, 1977 through October 3, 1983. The IBIS devices were installed on HH-52A and HH-3F model helicopters for the USCG by the helicopter manufacturer, Sikorsky Aircraft Corporation. Sikorsky built 99 versions of the HH-52A for USCG, and each helicopter had one IBIS device installed on each of three rotor blades, resulting in a total of up to 297 IBIS devices installed on HH-52A helicopters. Sikorsky also built 50 Model HH-3F helicopters procured by the USCG, with one IBIS device installed on each of five rotor blades, resulting in a total of up to 250 IBIS devices. Spare blades were also obtained by USCG with IBIS devices installed on them. USCG returned nine of these spares to General Nucleonics in 2015 for disposal, although the total number of spare blades procured is not known. Sikorsky confirmed that IBIS devices were installed only on Models HH-3F and HH-52A for the USCG, and USCG no longer operates any of these helicopters. The USCG was informed by General Nucleonics that records were confirmed for 330 IBIS devices transferred to USCG, and USCG noted that some HH-52A and HH-3F helicopters had been identified with a system installed similar to IBIS but that did not use or contain any radioactive material. It is therefore concluded that the total number of IBIS containing Sr-90 devices installed in USCG helicopters was at least 330 and could have been as many as 547.

General Nucleonics manufactured the IBIS under California Department of Public Health License No. 3138-70 GL and transferred the devices to the USCG as General License devices to be possessed and used by the USCG in accordance with regulatory requirements in 10 CFR 31.5. The manufacturer's detailed description of the device is contained in Sealed Source and Device Registration No. CA-321-D-103G, dated January 27, 1977.

II. Investigation of Status of US Coast Guard Devices

a. Inspection Scope

The USCG operated two helicopter models, HH-52A and HH-3F, which had Sr-90 sources installed in devices on the helicopter rotor blades. This NRC inspection was a focused evaluation of efforts by the USCG to determine how many former USCG helicopters had been transferred out of USCG control with the IBIS containing Sr-90 installed on the aircraft, and to safely remove or properly transfer those sources identified. The NRC first informed the USCG in July 2014 that IBIS devices had been identified as being installed on one HH-52A helicopter on display at the NEAM, and it was not known at that time if other helicopters with IBIS devices were accessible to the public.

b. Observations and Findings

Once the USCG became aware of the three IBIS devices at the NEAM, they initiated an investigation to determine the status of as many as possible of the remaining HH-52A and HH-3F helicopters and whether they had IBIS devices installed, as well as to determine whether any additional IBIS devices remained in USCG spare parts inventory. The USCG based the investigation on available USCG records in combination with a publicly-available database at www.helis.com to define the baseline for the scope of the investigation into current status of helicopters formerly operated by the USCG. The number of helicopters included in the USCG investigation is shown in the following table:

Maximum number of IBIS devices installed in US Coast Guard Helicopters

	Number of helicopters	IBIS Devices (blades) per helicopter	Total potential IBIS Devices
HH-52	99	3	297
HH-3F	50	5	250
Known spares (properly transferred from inventory)	9 spare blades	1	9
TOTAL IBIS			556

As a result of the investigation, USCG discovered five additional privately-owned former USCG helicopters with IBIS devices installed. USCG took action to safely remove and transfer the identified IBIS devices. As of April 26, 2017, one remaining HH-52A in California had IBIS devices installed which were not yet transferred or disposed. The USCG agreed to report to NRC when that transfer or removal is completed, and USCG

anticipated this will occur within a few months. The remaining three IBIS devices are being adequately controlled until they can be transferred or removed.

USCG determined the status of as many helicopters as could be found, with the results summarized in the table below. The category identified as "AMARC" references the military procedure intended to assure that hazardous materials, including radioactive materials, were removed prior to transferring the helicopter from US Government control. AMARC refers to what was the 309th Aircraft Maintenance and Regeneration Center which processed the retired aircraft. USCG determined that helicopters for which AMARC records existed were found to no longer have IBIS devices, and therefore USCG concluded that AMARC records reliably indicated correct removal of IBIS. However, AMARC records were not identified for all helicopters and it USCG has concluded that not all helicopters were processed through the AMARC system.

The category identified as "struck" indicates that the helicopter was lost or destroyed, either in a crash or through some other mechanism, and no other information could be identified.

SUMMARY OF US COAST GUARD INVESTIGATION FINDINGS: NUMBERS OF HELICOPTERS:

	HH-52	HH-3F	Number of helicopters
IBIS devices confirmed to be present/ have been removed	4	1	5
IBIS devices confirmed to be present/ not yet removed	1	0	0
"Cleared"(Verified No IBIS devices)	45	19	64
AMARC (records identified showing processed per demilitarization procedures)	14	26	40
Partial information/ no record of AMARC	7	0	7
Unknown / No Information	1	1	2
Struck (Crashed or otherwise destroyed)	27	3	30
TOTAL HELICOPTERS	99	50	149

c. Conclusions

One Severity Level IV violation of 10 CFR 31.5(c)(8) was identified.

The USCG obtained the IBIS devices, each containing 100 microcuries Sr-90, from General Nucleonics during the period of August 5, 1977 through October 3, 1983. The IBIS devices were manufactured and initially transferred by General Nucleonics in accordance with License No. 3138-70 GL issued by the State of California, Department of Public Health, under regulations equivalent to the NRC regulations in 10 CFR 32.51

and 10 CFR 31.5(b). The IBIS devices possessed by USCG are therefore subject to the General License described in 10 CFR 31.5. The USCG currently does not possess or operate any helicopters which have the IBIS devices installed.

10 CFR 31.5(c)(8)(i) requires, in part, that any person who acquires, receives, possesses, uses or transfers byproduct material in a device pursuant to the general license, shall transfer or dispose of the device containing byproduct material only by export as provided by paragraph (c)(7) of this section, by transfer to another general licensee as authorized in paragraph (c)(9) of this section, or to a person authorized to receive the device by a specific license issued under parts 30 and 32 of this chapter, or part 30 of this chapter that authorizes waste collection, or equivalent regulations of an Agreement State, or as otherwise approved under paragraph (c)(8)(iii) of this section.

Contrary to the above, the USCG failed to transfer or dispose of devices containing byproduct material only by the authorized means specified in 10 CFR 31.5(c)(8)(i). Specifically, at various times after August 5, 1977, and prior to June 2, 2014, the USCG improperly transferred one HH-3F and five HH-52A helicopters with an installed total of 20 General License IBIS devices to others who were not authorized to receive those devices. These transfers by USCG resulted in possession of the devices by six recipients not authorized to possess byproduct material under the NRC General License in Connecticut (1), New Jersey (1), Pennsylvania (2), California (1), and Oregon (1).

The USCG made extensive efforts to determine the location and status of the remaining former USCG helicopters and to assure that no General License IBIS devices remained uncontrolled. The investigation identified five additional helicopters with IBIS devices installed, and was effective in determining current status of as many helicopters and IBIS as possible considering the significant elapsed time since USCG physically transferred these helicopters out of USCG control. In March 2015, the USCG took action to safely remove the IBIS devices identified as still-installed on the HH-52A at the NEAM. The USCG subsequently also removed IBIS devices from helicopters in Teterboro, NJ; West Chester, PA; Reading, PA; and White City, OR, and transferred them to the manufacturer for disposal. As of April 26, 2017, USCG was working to properly transfer possession of the IBIS devices to the current helicopter owner located in Riverside, CA. USCG has committed to inform NRC when the transfer of the general license for the three IBIS devices on the HH-52 helicopter is completed, and to report the transfers in accordance with the requirements of 10 CFR 31.5(c)(8)(ii).

Following the determination of the final disposition of as many IBIS devices as possible during its investigation, USCG made a telephone report (Event Report No. 52684) to the NRC Headquarters Operations Officer on April 17, 2017, as required by 10 CFR 20.2201(a)(i). USCG indicated the written follow-up report required by 10 CFR 20.2201(b) would be submitted as required, and is due on May 17, 2017.

III. Exit Meeting

The inspector discussed the conclusions described in this report with LDCR Andrew Schanno, USCG, during an exit meeting conducted by telephone on April 26, 2017.

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

US Coast Guard

CAPT R. Hartnett
LCDR A. Schanno
CWO R. Fielder
T. J. Granito
F. Esposito
R. Lipinski

INSPECTION PROCEDURES USED

87103 Inspection of Material Licensees Involved in an Incident or Bankruptcy

LIST OF DOCUMENTS REVIEWED

Sealed Source and Device Registration No. CA-321-D-103G, dated January 27, 1977
California Department of Public Health License No. 3138-70 GL
NMED Item 170198

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713

May 8, 2017

EA-17- 037

Bruce Baffer
Rear Admiral
United States Coast Guard
Department of Homeland Security
2703 Martin Luther King Jr. Avenue, SE
Washington, DC 20593-7000

SUBJECT: NRC SPECIAL INSPECTION REPORT NO. 99990001/2015001, UNITED STATES COAST GUARD, AND NOTICE OF VIOLATION

Dear Admiral Baffer,

This letter refers to the special inspection conducted from May 26, 2015, through April 26, 2017, of US Coast Guard (USCG) activities authorized by the General License described in 10 CFR 31.5, as they relate to radiation safety and to compliance with the Commission's rules and regulations.

Background

On June 2, 2014, a representative from the Connecticut Department of Energy and Environmental Protection (CT DEEP) notified NRC Region I that a former USCG helicopter, an "H-52A Seaguard" on display at the New England Air Museum (NEAM), Windsor Locks, CT, was found to have three 100 microcurie Sr-90 radioactive sources installed in devices mounted on the helicopter rotor blades. Following the discovery of the devices on the helicopter, the NRC responded to the NEAM on June 9, 2014, to review the information provided by CT DEEP. That inspection confirmed the presence of In-Flight Blade Inspection System (IBIS) devices installed on the helicopter, which are subject to the General License requirements contained in 10 CFR Part 31.5. NEAM determined that it owned the H-52A helicopter on display, having obtained it in a transfer from the USCG on or about May 30, 1989. NEAM staff were not aware that the helicopter had Sr-90 General License devices installed until informed by CT DEEP personnel on June 2, 2014.

USCG initiated an investigation to determine how the devices had been transferred to the NEAM, and also to determine the extent of the condition. USCG subsequently confirmed the presence of IBIS devices on five additional helicopters in New Jersey, Pennsylvania, California, and Oregon. USCG safely removed the IBIS devices from the NEAM on March 17, 2015, and has since removed the IBIS devices from four additional helicopters. USCG is taking action to properly transfer or remove the IBIS from the one remaining helicopter.

Results

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The violation was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at (http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html). The violation involved

the failure to transfer or dispose of devices containing byproduct material only by the authorized means specified in 10 CFR 31.5(c)(8)(i). The violation is cited in the enclosed Notice of Violation because it was identified by the NRC.

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If you have any questions regarding this matter, please contact Todd Jackson of my staff at 610-337-5308 or via electronic mail Todd.Jackson@nrc.gov.

Thank you for your cooperation.

Sincerely,

Blake D. Welling, Chief
Commercial, Industrial, R&D
and Academic Branch
Division of Nuclear Materials Safety

Docket No. 99990001

Enclosures:
1. Notice of Violation
2. Inspection Report 99990001/2015001

cc w/encls: CAPT Randall Hartnett, USCG
LCDR Andrew Schanno, USCG
State of California
State of Connecticut
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cc w/encls: CAPT Randall Hartnett, USCG
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R Sun, NMSS	M McLaughlin, R1	K Wagner, NMSS
S Holiday, NMSS	C Crisden, R1	D Bearde, R1
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NAME	TJackson		MMcLaughlin		BWelling			
DATE	5/3/17		5/4/17		5/8/17			

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NOTICE OF VIOLATION

United States Coast Guard
Washington, DC

Docket No. 99990001
EA-17-037

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> Contrary to the above, the US Coast Guard (USCG) failed to transfer or dispose of devices containing byproduct material only by the authorized means specified in 10 CFR 31.5(c)(8)(i). Specifically, at various times after August 5, 1977, and prior to June 2, 2014, the USCG improperly transferred one HH-3F and five HH-52A helicopters with an installed total of 20 General License In-Flight Blade Inspection System (IBIS) devices to others who were not authorized to receive those devices. These transfers by the US Coast Guard resulted in possession of the devices by six recipients not authorized to possess byproduct material under the NRC General License in Connecticut (1), New Jersey (1), Pennsylvania (2), California (1), and Oregon (1).
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In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 8th day of May 2017

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Inspection No.	99990001/2015001
Docket No.	99990001
License No.	General License
EA No.	EA-17-037
Licensee:	United States Coast Guard
Location:	Headquarters, United States Coast Guard Department of Homeland Security 2703 Martin Luther King Jr. Avenue, SE Washington, DC 20593-7000
Inspection Dates:	May 26, 2015, through April 26, 2017

Inspectors: _____ May 3, 2017
Todd Jackson Date
Senior Health Physicist
Commercial, Industrial, R&D and Academic Branch
Division of Nuclear Materials Safety

Approved By: _____ 5/8/2017
Blake Welling, Chief Date
Commercial, Industrial, R&D and Academic Branch
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

United States Coast Guard
NRC Inspection Report No. 99990001/2015001

The US Coast Guard (USCG) operated two helicopter models, HH-52A and HH-3F, which had strontium-90 (Sr-90) sources installed in devices on the helicopter rotor blades. This NRC inspection was a focused evaluation of efforts by the USCG to determine how many former USCG helicopters had been transferred out of USCG control with the In-Flight Blade Inspection System (IBIS) containing Sr-90 installed on the aircraft, and to safely remove or properly transfer those sources identified.

An HH-52A helicopter with IBIS Sr-90 devices installed was discovered by the Connecticut Department of Energy and Environmental Protection on display at a public museum in Connecticut in June 2014. From approximately August 5, 1977, through October 3, 1983, the USCG obtained 99 HH-52A and 50 HH-3F helicopters incorporating up to 556 General License IBIS devices and few records existed to demonstrate these devices were properly transferred from USCG control or disposed.

The USCG removed the IBIS devices discovered on the HH-52A at the museum in Connecticut and initiated an investigation to determine the extent of the condition and whether additional helicopters had been transferred to others with IBIS devices still installed. USCG identified five additional helicopters with IBIS devices in New Jersey, Pennsylvania, California, and Oregon. The USCG investigation also determined that 64 helicopters did not have IBIS installed, 40 appeared to have been subjected to proper demilitarization procedures and would have had IBIS removed during that process, 30 were lost through crashes or other known mechanisms of destruction, and 9 were identified for which no information could be found.

The NRC identified a Severity Level IV violation of 10 CFR 31.5(c)(8)(i) involving the failure to properly transfer general license devices to other owners. The USCG has safely removed IBIS devices and Sr-90 sources from five of the six identified privately-owned former USCG helicopters, and actions are progressing to properly transfer or remove the IBIS from the one remaining helicopter with IBIS installed.

REPORT DETAILS

I. Program Overview and Background

On June 2, 2014, a representative from the Connecticut Department of Energy and Environmental Protection (CT DEEP) notified NRC Region I that an "H-52A Seaguard" helicopter on display at the New England Air Museum (NEAM), Windsor Locks, CT, had three strontium-90 (Sr-90) radioactive sources installed in devices mounted on the aircraft rotor blades. The NRC responded to the NEAM to review the information provided by CT DEEP and confirmed the presence of installed In-Flight Blade Inspection System (IBIS) devices on the helicopter which are subject to the General License requirements contained in 10 CFR Part 31.5. NEAM determined that it owned the H-52A helicopter on display, having obtained it in a transfer from the US Coast Guard (USCG) on or about May 30, 1989. Although identified as a Model "H-52A", the displayed helicopter is apparently a Model HH-52A, based on information provided by the aircraft manufacturer and the USCG. NEAM was not aware that the helicopter had Sr-90 General License devices installed until informed by CT DEEP personnel on June 2, 2014.

IBIS devices used by the USCG each incorporated 100 microcuries of Sr-90, and were manufactured and supplied by General Nucleonics Corporation of Pomona, CA, from approximately August 5, 1977 through October 3, 1983. The IBIS devices were installed on HH-52A and HH-3F model helicopters for the USCG by the helicopter manufacturer, Sikorsky Aircraft Corporation. Sikorsky built 99 versions of the HH-52A for USCG, and each helicopter had one IBIS device installed on each of three rotor blades, resulting in a total of up to 297 IBIS devices installed on HH-52A helicopters. Sikorsky also built 50 Model HH-3F helicopters procured by the USCG, with one IBIS device installed on each of five rotor blades, resulting in a total of up to 250 IBIS devices. Spare blades were also obtained by USCG with IBIS devices installed on them. USCG returned nine of these spares to General Nucleonics in 2015 for disposal, although the total number of spare blades procured is not known. Sikorsky confirmed that IBIS devices were installed only on Models HH-3F and HH-52A for the USCG, and USCG no longer operates any of these helicopters. The USCG was informed by General Nucleonics that records were confirmed for 330 IBIS devices transferred to USCG, and USCG noted that some HH-52A and HH-3F helicopters had been identified with a system installed similar to IBIS but that did not use or contain any radioactive material. It is therefore concluded that the total number of IBIS containing Sr-90 devices installed in USCG helicopters was at least 330 and could have been as many as 547.

General Nucleonics manufactured the IBIS under California Department of Public Health License No. 3138-70 GL and transferred the devices to the USCG as General License devices to be possessed and used by the USCG in accordance with regulatory requirements in 10 CFR 31.5. The manufacturer's detailed description of the device is contained in Sealed Source and Device Registration No. CA-321-D-103G, dated January 27, 1977.

II. Investigation of Status of US Coast Guard Devices

a. Inspection Scope

The USCG operated two helicopter models, HH-52A and HH-3F, which had Sr-90 sources installed in devices on the helicopter rotor blades. This NRC inspection was a focused evaluation of efforts by the USCG to determine how many former USCG helicopters had been transferred out of USCG control with the IBIS containing Sr-90 installed on the aircraft, and to safely remove or properly transfer those sources identified. The NRC first informed the USCG in July 2014 that IBIS devices had been identified as being installed on one HH-52A helicopter on display at the NEAM, and it was not known at that time if other helicopters with IBIS devices were accessible to the public.

b. Observations and Findings

Once the USCG became aware of the three IBIS devices at the NEAM, they initiated an investigation to determine the status of as many as possible of the remaining HH-52A and HH-3F helicopters and whether they had IBIS devices installed, as well as to determine whether any additional IBIS devices remained in USCG spare parts inventory. The USCG based the investigation on available USCG records in combination with a publicly-available database at www.helis.com to define the baseline for the scope of the investigation into current status of helicopters formerly operated by the USCG. The number of helicopters included in the USCG investigation is shown in the following table:

Maximum number of IBIS devices installed in US Coast Guard Helicopters

	Number of helicopters	IBIS Devices (blades) per helicopter	Total potential IBIS Devices
HH-52	99	3	297
HH-3F	50	5	250
Known spares (properly transferred from inventory)	9 spare blades	1	9
TOTAL IBIS			556

As a result of the investigation, USCG discovered five additional privately-owned former USCG helicopters with IBIS devices installed. USCG took action to safely remove and transfer the identified IBIS devices. As of April 26, 2017, one remaining HH-52A in California had IBIS devices installed which were not yet transferred or disposed. The USCG agreed to report to NRC when that transfer or removal is completed, and USCG

anticipated this will occur within a few months. The remaining three IBIS devices are being adequately controlled until they can be transferred or removed.

USCG determined the status of as many helicopters as could be found, with the results summarized in the table below. The category identified as "AMARC" references the military procedure intended to assure that hazardous materials, including radioactive materials, were removed prior to transferring the helicopter from US Government control. AMARC refers to what was the 309th Aircraft Maintenance and Regeneration Center which processed the retired aircraft. USCG determined that helicopters for which AMARC records existed were found to no longer have IBIS devices, and therefore USCG concluded that AMARC records reliably indicated correct removal of IBIS. However, AMARC records were not identified for all helicopters and it USCG has concluded that not all helicopters were processed through the AMARC system.

The category identified as "struck" indicates that the helicopter was lost or destroyed, either in a crash or through some other mechanism, and no other information could be identified.

SUMMARY OF US COAST GUARD INVESTIGATION FINDINGS: NUMBERS OF HELICOPTERS:

	HH-52	HH-3F	Number of helicopters
IBIS devices confirmed to be present/ have been removed	4	1	5
IBIS devices confirmed to be present/ not yet removed	1	0	0
"Cleared"(Verified No IBIS devices)	45	19	64
AMARC (records identified showing processed per demilitarization procedures)	14	26	40
Partial information/ no record of AMARC	7	0	7
Unknown / No Information	1	1	2
Struck (Crashed or otherwise destroyed)	27	3	30
TOTAL HELICOPTERS	99	50	149

c. Conclusions

One Severity Level IV violation of 10 CFR 31.5(c)(8) was identified.

The USCG obtained the IBIS devices, each containing 100 microcuries Sr-90, from General Nucleonics during the period of August 5, 1977 through October 3, 1983. The IBIS devices were manufactured and initially transferred by General Nucleonics in accordance with License No. 3138-70 GL issued by the State of California, Department of Public Health, under regulations equivalent to the NRC regulations in 10 CFR 32.51

and 10 CFR 31.5(b). The IBIS devices possessed by USCG are therefore subject to the General License described in 10 CFR 31.5. The USCG currently does not possess or operate any helicopters which have the IBIS devices installed.

10 CFR 31.5(c)(8)(i) requires, in part, that any person who acquires, receives, possesses, uses or transfers byproduct material in a device pursuant to the general license, shall transfer or dispose of the device containing byproduct material only by export as provided by paragraph (c)(7) of this section, by transfer to another general licensee as authorized in paragraph (c)(9) of this section, or to a person authorized to receive the device by a specific license issued under parts 30 and 32 of this chapter, or part 30 of this chapter that authorizes waste collection, or equivalent regulations of an Agreement State, or as otherwise approved under paragraph (c)(8)(iii) of this section.

Contrary to the above, the USCG failed to transfer or dispose of devices containing byproduct material only by the authorized means specified in 10 CFR 31.5(c)(8)(i). Specifically, at various times after August 5, 1977, and prior to June 2, 2014, the USCG improperly transferred one HH-3F and five HH-52A helicopters with an installed total of 20 General License IBIS devices to others who were not authorized to receive those devices. These transfers by USCG resulted in possession of the devices by six recipients not authorized to possess byproduct material under the NRC General License in Connecticut (1), New Jersey (1), Pennsylvania (2), California (1), and Oregon (1).

The USCG made extensive efforts to determine the location and status of the remaining former USCG helicopters and to assure that no General License IBIS devices remained uncontrolled. The investigation identified five additional helicopters with IBIS devices installed, and was effective in determining current status of as many helicopters and IBIS as possible considering the significant elapsed time since USCG physically transferred these helicopters out of USCG control. In March 2015, the USCG took action to safely remove the IBIS devices identified as still-installed on the HH-52A at the NEAM. The USCG subsequently also removed IBIS devices from helicopters in Teterboro, NJ; West Chester, PA; Reading, PA; and White City, OR, and transferred them to the manufacturer for disposal. As of April 26, 2017, USCG was working to properly transfer possession of the IBIS devices to the current helicopter owner located in Riverside, CA. USCG has committed to inform NRC when the transfer of the general license for the three IBIS devices on the HH-52 helicopter is completed, and to report the transfers in accordance with the requirements of 10 CFR 31.5(c)(8)(ii).

Following the determination of the final disposition of as many IBIS devices as possible during its investigation, USCG made a telephone report (Event Report No. 52684) to the NRC Headquarters Operations Officer on April 17, 2017, as required by 10 CFR 20.2201(a)(i). USCG indicated the written follow-up report required by 10 CFR 20.2201(b) would be submitted as required, and is due on May 17, 2017.

III. Exit Meeting

The inspector discussed the conclusions described in this report with LDCR Andrew Schanno, USCG, during an exit meeting conducted by telephone on April 26, 2017.

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

US Coast Guard

CAPT R. Hartnett
LCDR A. Schanno
CWO R. Fielder
T. J. Granito
F. Esposito
R. Lipinski

INSPECTION PROCEDURES USED

87103 Inspection of Material Licensees Involved in an Incident or Bankruptcy

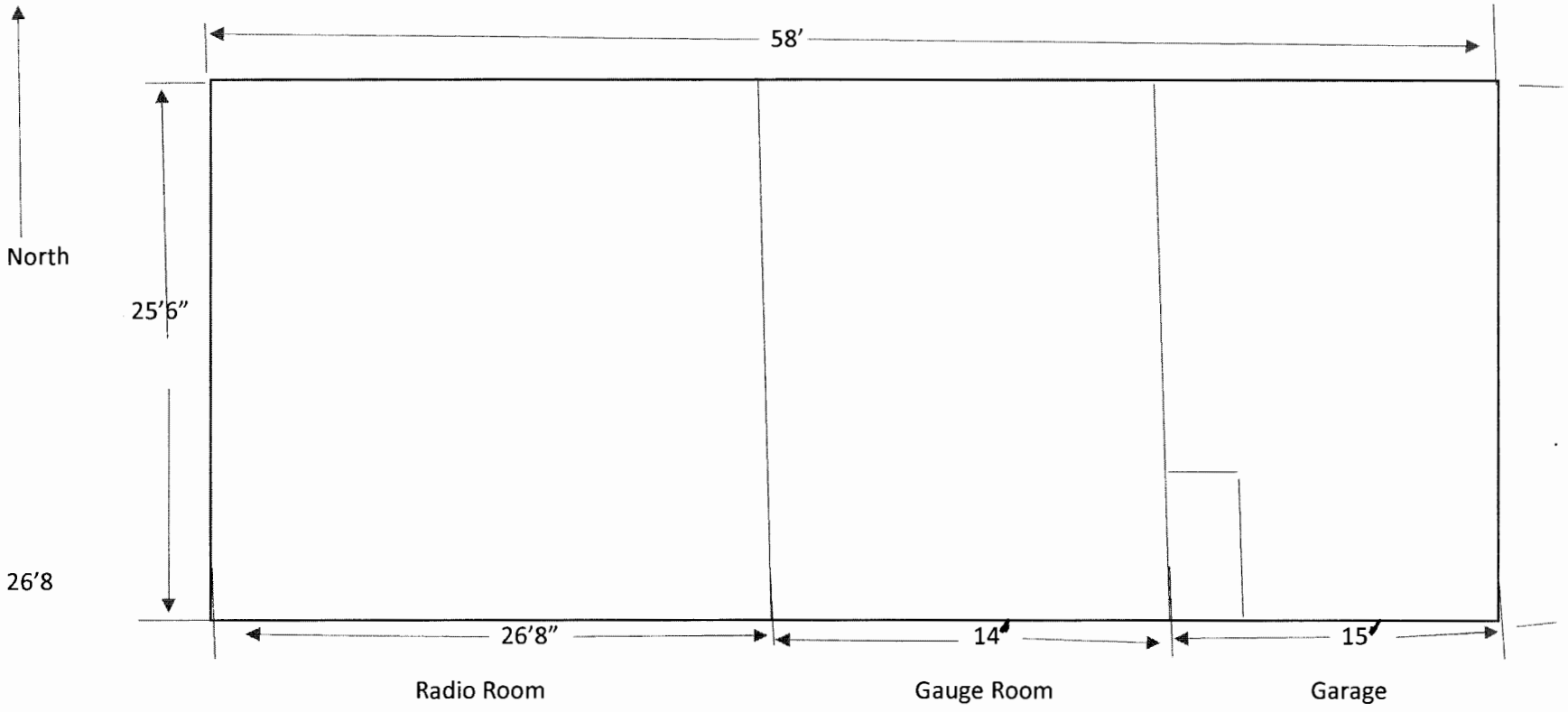
LIST OF DOCUMENTS REVIEWED

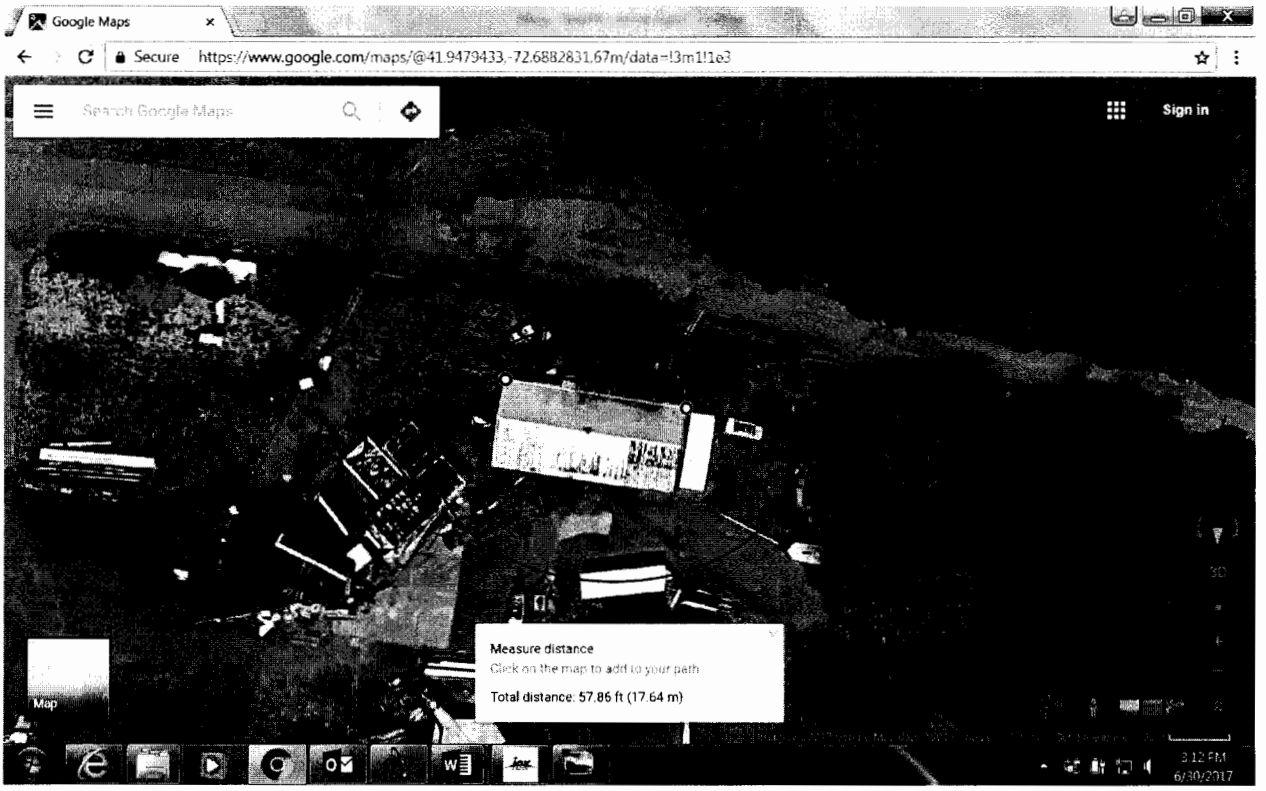
Sealed Source and Device Registration No. CA-321-D-103G, dated January 27, 1977
California Department of Public Health License No. 3138-70 GL
NMED Item 170198

ATTACHMENT 5

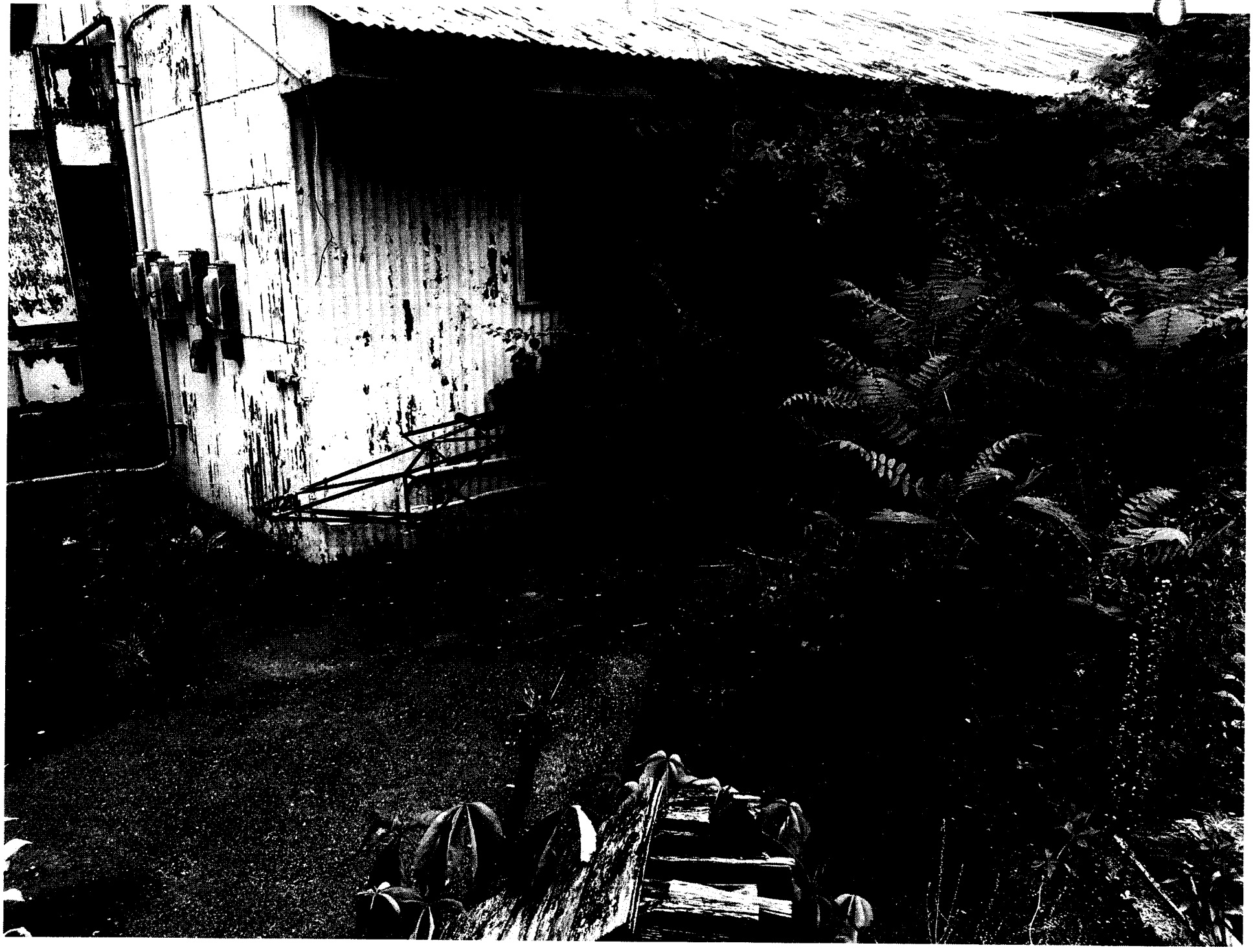
Gauge Building Schematic and Photographs

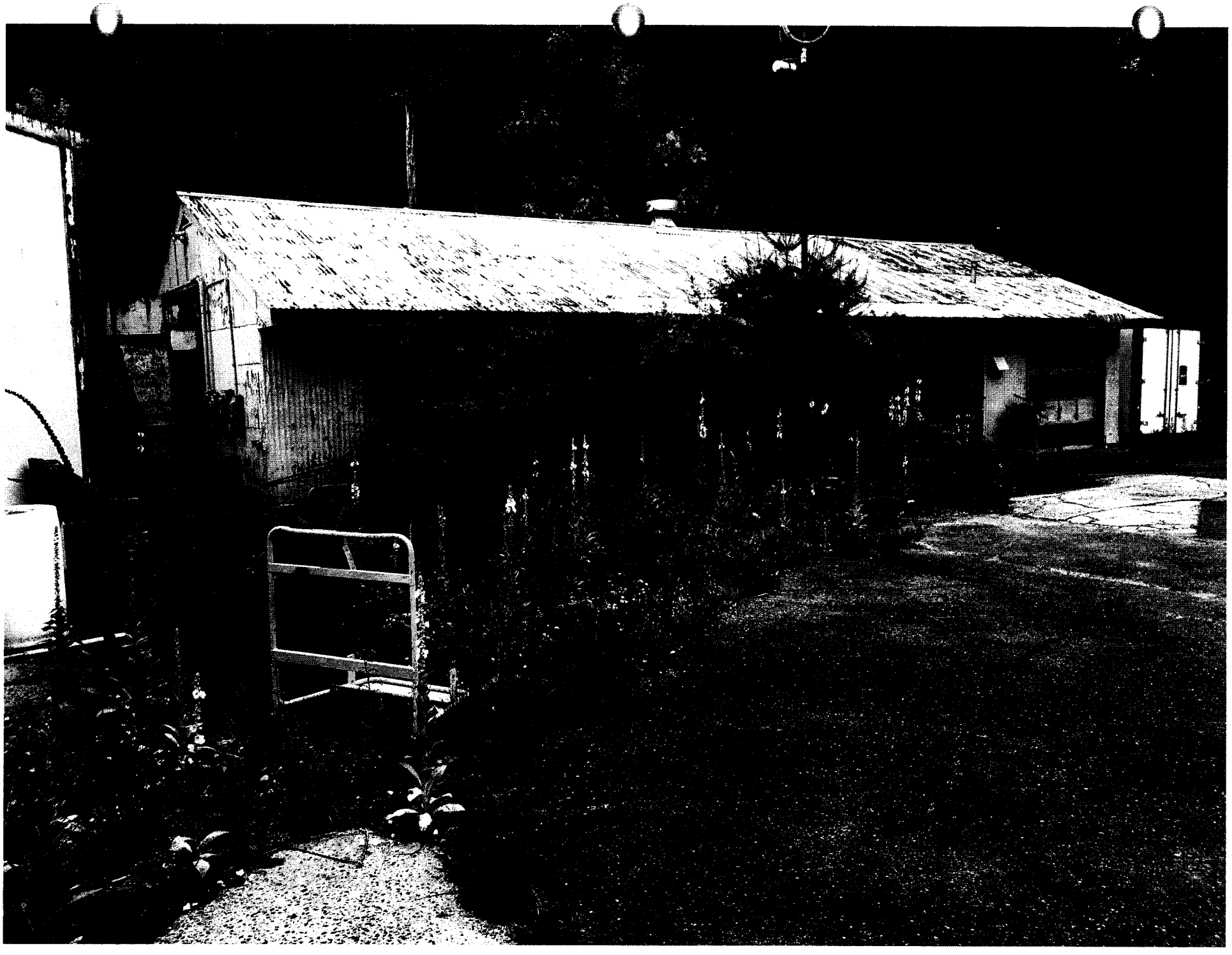
New England Air Museum (NEAM) Garage with Gauge and Radio rooms

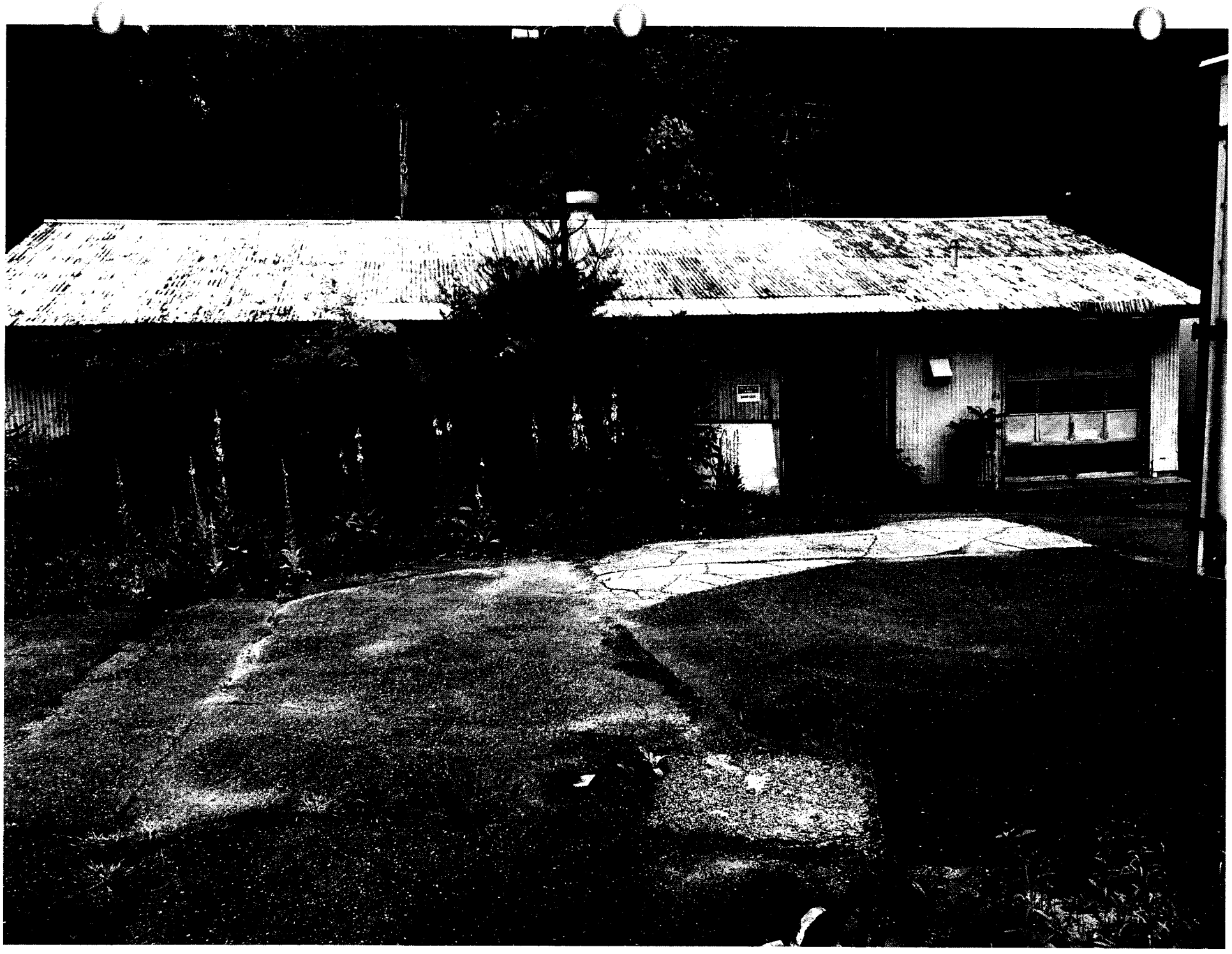


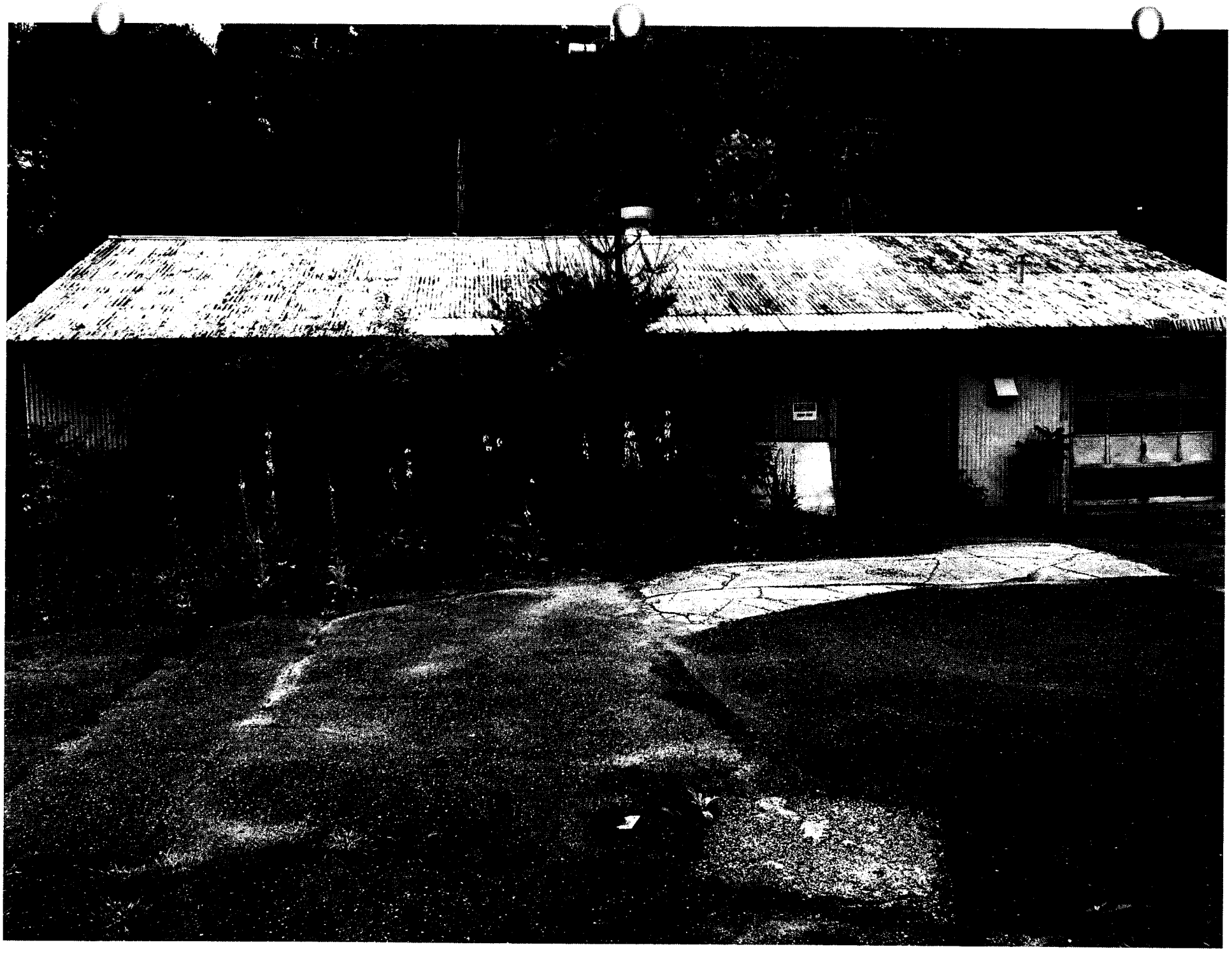


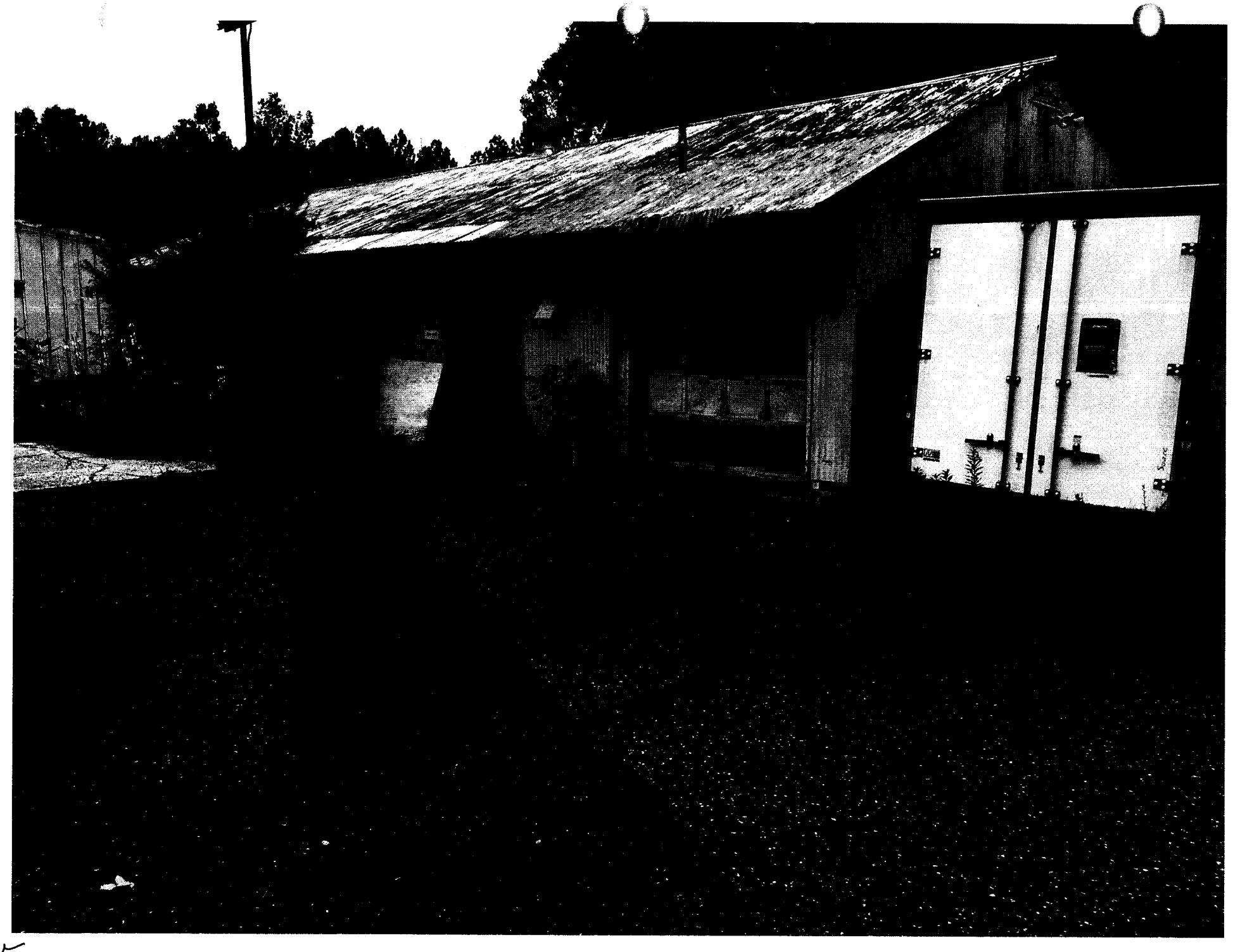
New England Air Museum (NEAM) Aerial View of Garage Building











8

11

13

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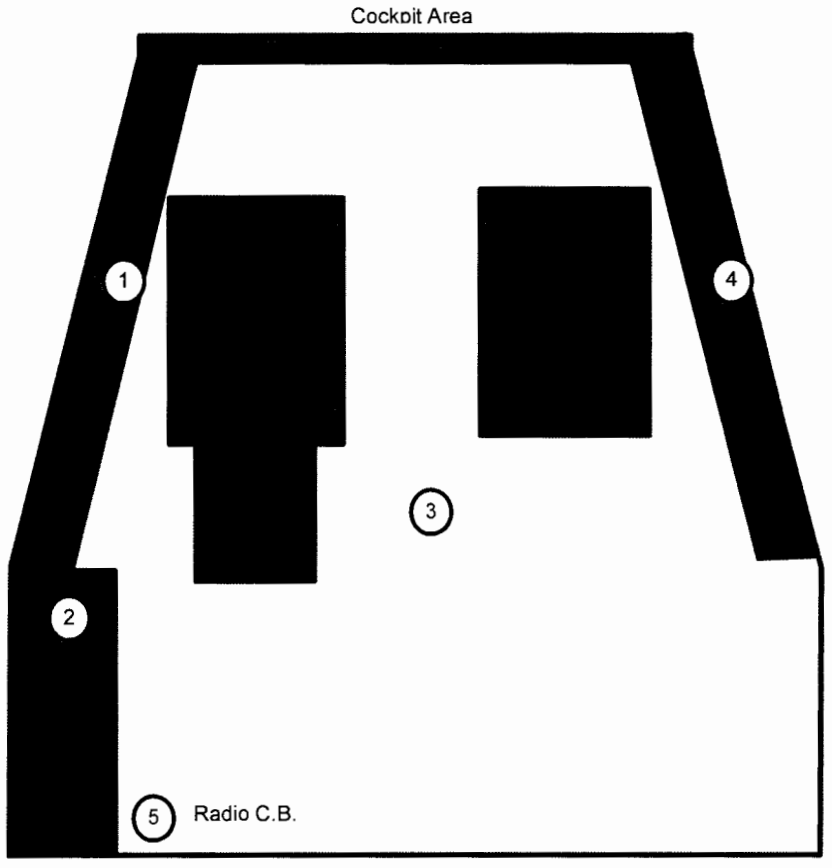
ATTACHMENT 6

Survey Results – Area Surrounding Gauge Building

RADIOLOGICAL SURVEY FORM

Location: NEAM Exterior Aircraft Douglas A3 | Purpose: Final Status Survey - Smears

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
1	2	ND
2	ND	18
3	ND	ND
4	ND	ND
5	ND	18



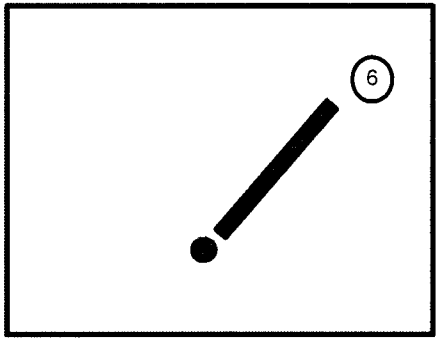
Comments:	Instrumentation	Key O=Smear Location			
MDA: α 14.24 DPM / β 18.02 DPM	Make: Ludlum	Model: 3030P	Serial #: 266689	Cal Due: 09/09/14	QA Check: Sat
Efficiency:	Make:	Model:	Serial #:	Cal Due:	QA Check:
α 26.5 % / β 22.4 %	Make:	Model:	Serial #:	Cal Due:	QA Check:
"ND" = "Non Detect" < = Background Radiation = α .6 CPM / β 42 CPM		Performed By		Date: 8/27/14	
		Reviewed By		Date: 8/29/14	

RADIOLOGICAL SURVEY FORM

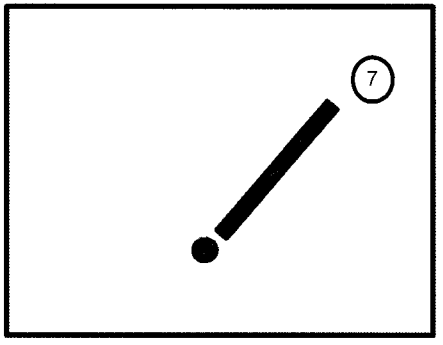
Location:NEAM Exterior Aircraft Gruman E1B | Purpose: Final Status Survey - Smears

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
6	ND	ND
7	ND	ND

Emergency Escape Hatch Front



Emergency Escape Hatch Front

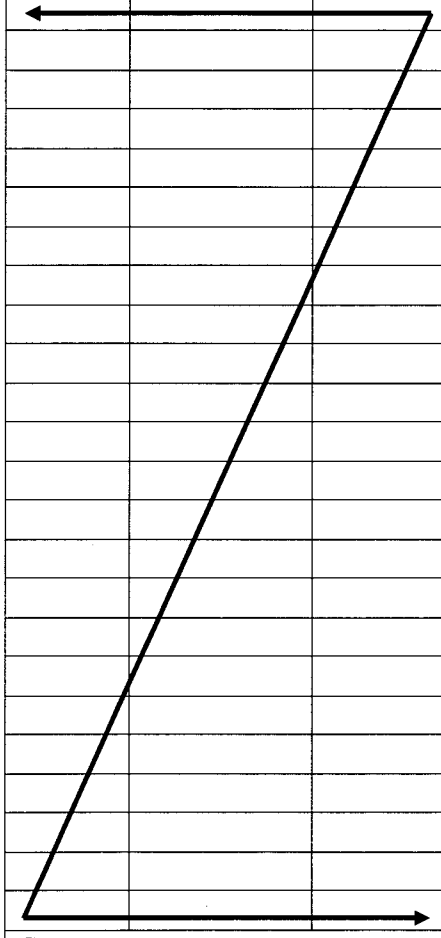


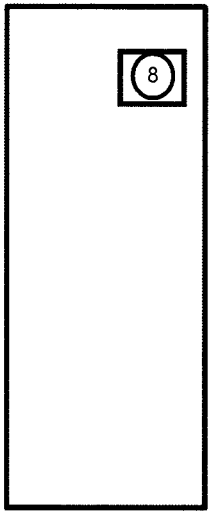
Comments:	Instrumentation	Key O=Smear Location			
MDA: α 14.24 DPM / β 18.02 DPM	Make: Ludlum	Model: 3030P	Serial #: 266689	Cal Due: 09/09/14	QA Check: Sat
Efficiency:	Make:	Model:	Serial #:	Cal Due:	QA Check:
α 26.5 % / β 22.4 %	Make:	Model:	Serial #:	Cal Due:	QA Check:
"ND" = "Non Detect" < = Background Radiation = α .6 CPM / β 42 CPM		Performed By		Date: 8/27/14	
		Reviewed By		Date: 8/29/14	

RADIOLOGICAL SURVEY FORM

Location: NEAM Exterior Aircraft RB-57A Canberra | Purpose: Final Status Survey - Smears

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
8	ND	ND



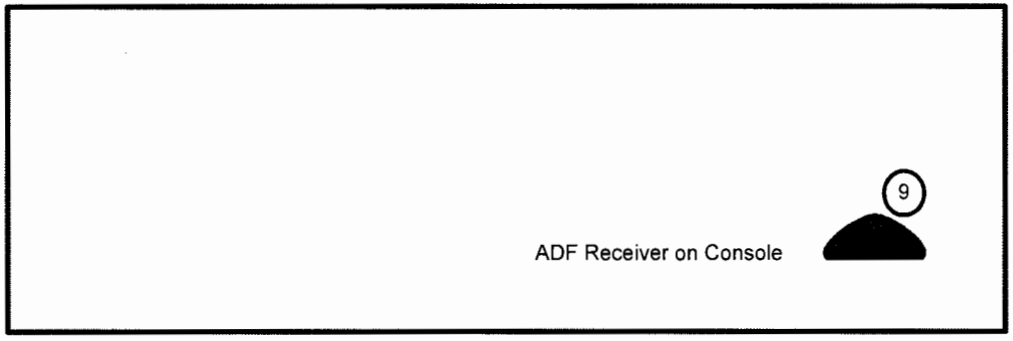


Comments:	Instrumentation	Key O=Smear Location			
MDA: α 14.24 DPM / β 18.02 DPM	Make: Ludlum	Model: 3030P	Serial #: 266689	Cal Due: 09/09/14	QA Check: Sat
Efficiency:	Make:	Model:	Serial #:	Cal Due:	QA Check:
α 26.5 % / β 22.4 %	Make:	Model:	Serial #:	Cal Due:	QA Check:
"ND" = "Non Detect" < = Background Radiation = α .6 CPM / β 42 CPM		Performed By		Date:	8/27/14
		Reviewed By		Date:	8/28/14

RADIOLOGICAL SURVEY FORM

Location: NEAM Exterior Aircraft C-7A Caribou | Purpose: Final Status Survey - Smears

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
9	ND	13

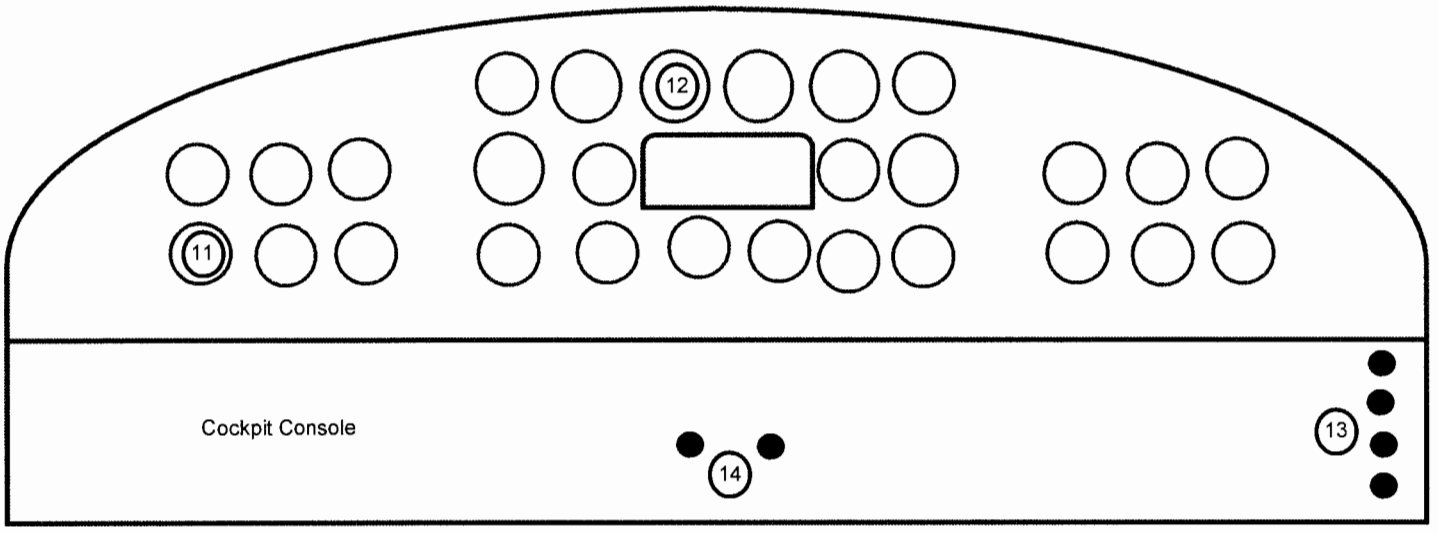


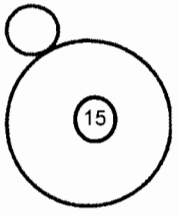
Comments:	Instrumentation	Key O=Smear Location			
MDA: α 14.24 DPM / β 18.02 DPM	Make: Ludlum	Model: 3030P	Serial #: 266689	Cal Due: 09/09/14	QA Check: Sat
Efficiency:	Make:	Model:	Serial #:	Cal Due:	QA Check:
α 26.5 % / β 22.4 %	Make:	Model:	Serial #:	Cal Due:	QA Check:
"ND" = "Non Detect" < = Background Radiation = α .6 CPM / β 42 CPM		Performed By		Date: 8/27/14	
		Reviewed By		Date: 8/28/14	

RADIOLOGICAL SURVEY FORM

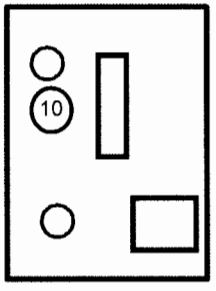
Location: NEAM Exterior Aircraft HU-16 Albatross | Purpose: Final Status Survey - Smears

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
10	ND	ND
11	ND	ND
12	ND	ND
13	5	4
14	2	ND
15	ND	ND





Pilot Side O2 Regulator



Rudder Boost Upper Side

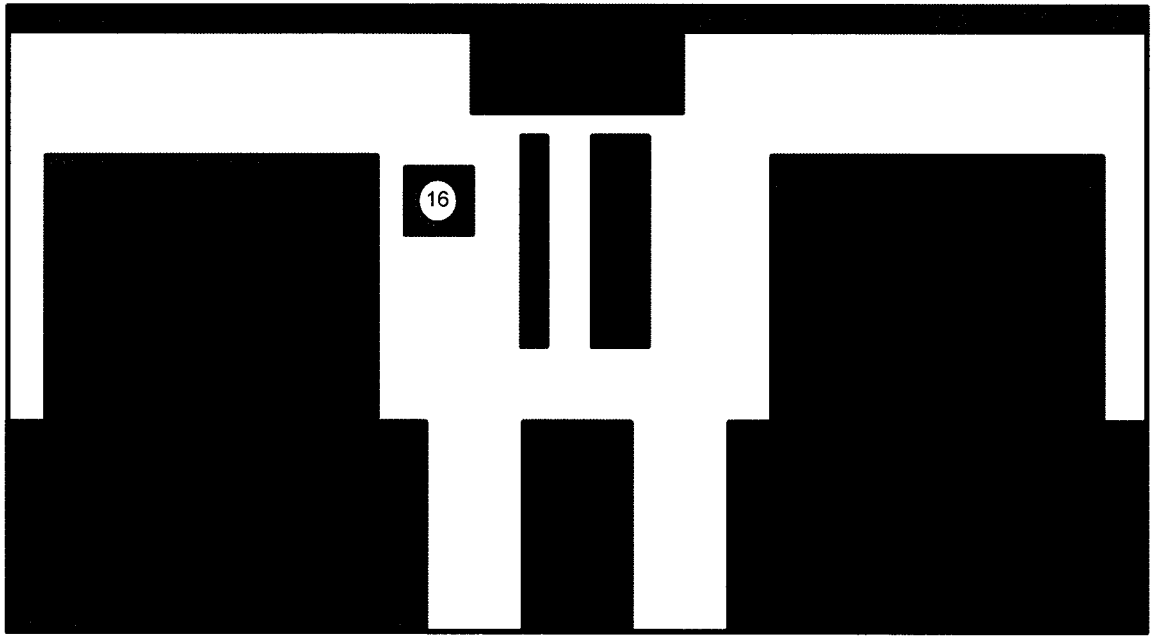
Comments:	Instrumentation	Key O=Smear Location			
MDA: α 14.24 DPM / β 18.02 DPM	Make: Ludlum	Model: 3030P	Serial #: 266689	Cal Due: 09/09/14	QA Check: Sat
Efficiency:	Make:	Model:	Serial #:	Cal Due:	QA Check:
α 26.5 % / β 22.4 %	Make:	Model:	Serial #:	Cal Due:	QA Check:
"ND" = "Non Detect" < = Background Radiation = α .6 CPM / β 42 CPM	Performed By			Date: 8/27/14	
	Reviewed By			Date: 8/29/14	

RADIOLOGICAL SURVEY FORM

Location:NEAM Exterior Aircraft K16B | Purpose: Final Status Survey - Smears

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β
16	ND	ND

Cockpit Area



Comments:	Instrumentation	Key O=Smear Location			
MDA: α 14.24 DPM / β 18.02 DPM	Make: Ludlum	Model: 3030P	Serial #: 266689	Cal Due: 09/09/14	QA Check: Sat
Efficiency:	Make:	Model:	Serial #:	Cal Due:	QA Check:
α 26.5 % / β 22.4 %	Make:	Model:	Serial #:	Cal Due:	QA Check:
"ND" = "Non Detect" < = Background Radiation = α .6 CPM / β 42 CPM		Performed By		Date: 8/27/14	
		Reviewed By		Date: 8/29/14	

Sample Counting Form

Location/Description:	NEAM Exterior Plane Surveys					
Instrument	Ludlum 3030P		Serial #	26689	Cal Due:	9/9/2014
Probe	N/A	EFF % α 26.5%, β 22.4%		MDA α 13 dpm/100cm^2, β 80 dpm/100 cm^2		
Location	Gross CPM (α)	BKG	DPM (α)	Gross CPM (β)	BKG (β)	DPM (β)
1	1	0.6	2	40	42	ND
2	0	0.6	ND	46	42	18
3	0	0.6	ND	40	42	ND
4	0	0.6	ND	35	42	ND
5	0	0.6	ND	46	42	18
6	0	0.6	ND	39	42	ND
7	0	0.6	ND	37	42	ND
8	0	0.6	ND	36	42	ND
9	0	0.6	ND	45	42	13
10	1	0.6	ND	39	42	ND
11	1	0.6	ND	38	42	ND
12	1	0.6	ND	31	42	ND
13	2	0.6	5	43	42	4
14	1	0.6	2	35	42	ND
15	0	0.6	ND	38	42	ND
16	0	0.6	ND	30	42	ND

Comments: "ND" < = Background Radition "BKG"; MDA calculated for a 2 minute sample count time.

Performed By:	Date: 8/28/14
Reviewed By: Neil E. Finch	Date: 8/29/14

ATTACHMENT 7

DandD Code Runs

5.b

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 3:31:22 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra+C	4.6	CONSTANT(pCi/g)
Justification for concentration: Ra-226+C		Value 2.36E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 5.69E-02 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.69E-02 **to** 5.70E-02 **mrem/year**

5.b

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 3:29:18 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	4.6	CONSTANT(pCi/g)
Justification for concentration: Ra226		Value 2.36E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 5.03E-01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.03E-01 **to** 5.04E-01 **mrem/year**

5. On Page 156, you provide your DandD calculation for the radioactivity in the soil at the gauge building. Please provide some additional justification for the following inputs of the calculation:

   a. You used Ra-226 instead of Ra-226 + C. Please describe why the daughters of Ra-226 were not considered in the calculation for the initial dose as it appears the contamination occurred over a number of years.

      Using the D&D modeling code, Ra-226 was a more conservative selection in our dose calculation versus Ra-226+C. The lower Annual TEDE of the Ra-226+C is the result of the 1st decay product of the Ra-226 decay chain is Rn-222, a gas, and would have dissipated into the atmosphere resulting in a significant reduction in dose since contamination was located in an outside environment. D&D modeling code results are enclosed to support the comparisons. Please see the table below.

Contaminant in soil	*Concentration (pCi/gm)*	*Area (m2)*	*Calculated Annual TEDE*	*Notes*
Ra-226	*40*	*10*	*18.5 mRem*	*1,2*
Ra-226 C	*40*	*10*	*2.1 mRem*	*1,2*

Notes: 1) Concentration based on maximum Ra-226 allowed to remain in soil before exceeding the State of Connecticut 19 mRem/yr TEDE standard.
2) Value selected based on initial estimated area of contamination. Refer to 5.c below for actual remediated area.

   b. Your initial activity input was 40 pCi/gm instead of the stated value of 4 pCi/gm. Describe why 40 pCi/gm was used instead of 4 pCi/gm?

      D&D modeling code was run iteratively to determine a screening value that was less than the NRC's 25 mrem/yr TEDE limit and the State of Connecticut's' 19 mrem/yr TEDE standard. The calculations resulted in 40 pCi/gm of Ra-226. The table below indicates the actual soil concentration, post remediation, and its calculated dose for Ra-226 and Ra-226+C. Area value is the actual remediated area in m^2. Refer to 5.c below.

Contaminant in soil	Concentration (pCi/gm)	Area (m2)	Calculated Annual TEDE	Notes
Ra-226	2.36	4.6	.5 mRem	
Ra-226+C	2.36	4.6	.05 mRem	

   c. You used 10 square meters for the size of the contamination. Your description states that this is only 18 square feet or about 2 square meters. Please state why you used a value of 10 square meters.

      Initial estimates of the bounded area were reported to be 10 square meters and the dose was calculated using this estimate. The actual area of remediation was 4.6 m^2. The table below indicates the dose results of the D&D Dose modeling code for 2 m^2, 4.6 m^2, 10 m^2, and unlimited area. All TEDE dose calculations are less than the NRC's 25 mrem/yr TEDE limit and the State of Connecticut's' 19

mrem/yr TEDE standard. Please note that the unlimited area concentration was based on 4.1 pci/gm of Ra-226 remaining in the soil. Post remediation soil sample results indicated one area with the highest concentration of 2.36 pCi/gm of Ra-226 remaining. The annual TEDE for this concentration is calculated to be .5 mrem TEDE using the actual remediated area of 4.6 m^2.

Contaminant in soil	*Concentration (pCi/gm)*	*Area (m2)*	*Calculated Annual TEDE*	*Notes*
Ra-226	*40*	*2*	*3.71 mRem*	
Ra-226	*40*	*4.6*	*8.53 mRem*	
Ra-226	*40*	*10*	*18.5 mRem*	
Ra-226	*4.1*	*Unlimited*	*19 mRem*	
Ra-226	*2.36*	*4.6*	*.5 mRem*	

5.9

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:35:14 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	10	CONSTANT(pCi/g)
Justification for concentration: 19 mRem TEDE. Ra-226 40 pCi/gm at 10 square meters.		Value 4.00E+01

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 1.85E+01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 1.85E+01 **to** 1.86E+01 **mrem/year**

5.9

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:37:25 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra+C	10	CONSTANT(pCi/g)
Justification for concentration: Ra-226 C, 40 pCi/gm, 10 sq meters.		Value 4.00E+01

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are** < 2.10E+00 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 2.10E+00 **to** 2.10E+00 **mrem/year**

5.b

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 3:29:18 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	4.6	CONSTANT(pCi/g)
Justification for concentration: Ra226		Value 2.36E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are** < 5.03E-01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.03E-01 **to** 5.04E-01 **mrem/year**

5.b

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 3:31:22 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName: S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra+C	4.6	CONSTANT(pCi/g)
Justification for concentration: Ra-226+C		Value 2.36E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are** < 5.69E-02 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.69E-02 **to** 5.70E-02 **mrem/year**

5.C

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:53:53 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	2	CONSTANT(pCi/g)
Justification for concentration: Initial 40 pCi/gm a 2 sq meters.		Value 4.00E+01

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 3.71E+00 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 3.71E+00 **to** 3.71E+00 **mrem/year**

5.C

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:56:41 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	4.6	CONSTANT(pCi/g)
Justification for concentration: Initial 40 pCi/gm at 4.6 sq meters.		Value 4.00E+01

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 8.53E+00 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 8.53E+00 **to** 8.53E+00 **mrem/year**

5.C

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:45:03 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	4.6	CONSTANT(pCi/g)
Justification for concentration: Highest post remediation results using actual remediated area.		Value 2.36E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 5.03E-01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.03E-01 **to** 5.04E-01 **mrem/year**

5.C

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 3:27:10 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	UNLIMITED	CONSTANT(pCi/g)
Justification for concentration: Radium		Value 4.10E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 1.90E+01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 1.90E+01 **to** 1.90E+01 **mrem/year**

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 2:53:11 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	4.6	CONSTANT(pCi/g)
Justification for concentration: Post Remediation		Value 2.36E+00

Chain Data:

Number of chains: **1**

Chain No. 1: **226Ra**
Nuclides in chain: **5**

Nuclide	Chain Position	Half Life	First Parent	Fractional Yield	Second Parent	Fractional Yield	Ingestion CEDE	Inhalation CEDE	Surface Dose Rate	15 cm Dose Rate

							Factor (Sv/Bq)	Factor (Sv/Bq)	Factor ((Sv/d)/(Bq/m^2))	Factor ((Sv/d)/(Bq/m^3))
226Ra	1	5.84E+05					3.58E-07	2.32E-06	5.56E-13	1.42E-14
222Rn	2	3.82E+00	1	1	0	0	0.00E+00	0.00E+00	3.41E-14	9.81E-16
210Pb	3	8.15E+03	2	1	0	0	1.45E-06	3.67E-06	2.14E-13	1.13E-15
210Bi	4	5.01E+00	3	1	0	0	1.73E-09	5.29E-08	9.06E-14	1.61E-15
210Po	5	1.38E+02	4	1	0	0	5.14E-07	2.54E-06	7.16E-16	2.11E-17

Initial Concentrations:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 **quantile value**

Nuclide	Soil Concentration (pCi/g)
226Ra	1.09E-01
222Rn	0.00E+00
210Pb	0.00E+00
210Bi	0.00E+00
210Po	0.00E+00

Model Parameters:

General Parameters:

Parameter Name	Description	Distribution
Tv (1):Translocation:Leafy	Translocation factor for leafy vegetables	CONSTANT(none)
Default value used		Value 1.00E+00
Tv (2):Translocation:Root	Translocation factor for other vegetables	CONSTANT(none)
Default value used		Value 1.00E-01
Tv (3):Translocation:Fruit	Translocation factor for fruit	CONSTANT(none)
Default value used		Value 1.00E-01
Tv (4):Translocation:Grain	Translocation factor for grain	CONSTANT(none)
Default value used		Value 1.00E-01
Tf(1):Translocation:Beef Forage	Translocation factor for forage consumed by beef cattle	CONSTANT(none)
Default value used		Value 1.00E+00

Tf (2):Translocation:Poultry Forage	Translocation factor for forage consumed by poultry	CONSTANT(none)
Default value used		Value 1.00E+00
Tf(3):Translocation:Milk Cow	Translocatioin factor for forage consumed by milk cows	CONSTANT(none)
Default value used		Value 1.00E+00
Tf (4):Translocation:Layer Hen Forage	Translocation factor for forage consumed by layer hens	CONSTANT(none)
Default value used		Value 1.00E+00
Tg(1):Translocation:Beef Grain	Translocation factor for stored grain consumed by beef cattle	CONSTANT(none)
Default value used		Value 1.00E-01
Tg (2):Translocation:Poultry Grain	Translocation factor for stored grain consumed by poultry	CONSTANT(none)
Default value used		Value 1.00E-01
Tg (3):Translocation:Milk Cow Grain	Translocation factor for stored grain consumed by milk cows	CONSTANT(none)
Default value used		Value 1.00E-01
Tg (4):Translocation:Layer Hen Grain	Translocation factor for stored grain consumed by layer hens	CONSTANT(none)
Default value used		Value 1.00E-01
Th(1):Translocation:Beef Hay	Translocation factor for stored hay consumed by beef cattle	CONSTANT(none)
Default value used		Value 1.00E+00
Th (2):Translocation:Poultry Hay	Translocation factor for stored hay consumed by poultry	CONSTANT(none)
Default value used		Value 1.00E+00
Th (3):Translocation:Milk Cow Hay	Translocation factor for stored hay consumed by milk cows	CONSTANT(none)
Default value used		Value 1.00E+00
Th (4):Translocation:Layer Hen Hay	Translocation factor for stored hay consumed by layer hens	CONSTANT(none)
Default value used		Value 1.00E+00
fca(1):Beef Carbon Fraction	Mass fraction of beef cattle that is carbon	CONSTANT(none)
Default value used		Value 3.60E-01
fca(2):Poultry Carbon Fraction	Mass fraction of poultry that is carbon	CONSTANT(none)
Default value used		Value 1.80E-01
	Mass fraction of milk that is carbon	CONSTANT(none)

fca(3):Milk Carbon Fraction		
Default value used		Value 6.00E-02
fca(4):Eggs Carbon Fraction	Mass fraction of an egg that is carbon	CONSTANT(none)
Default value used		Value 1.60E-01
fcf(1):Beef Forage Carbon Fraction	Mass fraction of wet forage consumed by beef cattle that is carbon	CONSTANT(none)
Default value used		Value 1.10E-01
fcf(2):Poultry Forage Carbon Fraction	Mass fraction of wet forage consumed by poultry that is carbon	CONSTANT(none)
Default value used		Value 1.10E-01
fcf(3):Milk Cow Forage Carbon Fraction	Mass fraction of wet forage consumed by milk cows that is carbon	CONSTANT(none)
Default value used		Value 1.10E-01
fcf(4):Layer Hen Forage Carbon Fraction	Mass fraction of wet forage consumed by layer hens that is carbon	CONSTANT(none)
Default value used		Value 1.10E-01
fcg(1):Beef Grain Carbon Fraction	Mass fraction of wet stored grain consumed by beef cattle that is carbon	CONSTANT(none)
Default value used		Value 4.00E-01
fcg(2):Poultry Grain Carbon Fraction	Mass fraction of wet stored grain consumed by poultry that is carbon	CONSTANT(none)
Default value used		Value 4.00E-01
fcg(3):Milk Cow Grain Carbon Fraction	Mass fraction of wet stored grain consumed by milk cows that is carbon	CONSTANT(none)
Default value used		Value 4.00E-01
fcg(4):Layer Hen Grain Carbon Fraction	Mass fraction of wet stored grain consumed by layer hens that is carbon	CONSTANT(none)
Default value used		Value 4.00E-01
fch(1):Beef Hay Carbon Fraction	Mass fraction of wet stored hay consumed by beef cattle that is carbon	CONSTANT(none)
Default value used		Value 7.00E-02
fch(2):Poultry Hay Carbon Fraction	Mass fraction of wet stored hay consumed by poultry that is carbon	CONSTANT(none)
Default value used		Value 7.00E-02
fch(3):Milk Cow Hay Carbon Fraction	Mass fraction of wet stored hay consumed by milk cows that is carbon	CONSTANT(none)
Default value used		Value 7.00E-02
fch(4):Layer Hen Hay Carbon Fraction	Mass fraction of wet stored hay consumed by layer hens that is carbon	CONSTANT(none)
Default value used		Value 7.00E-02
	Mass fraction of dry soil that is carbon	CONSTANT(none)

fCd:Soil Carbon Fraction		
Default value used		Value 3.00E-02
SATac:Animal Product Specific Activity	Specific activity equivalence of animal product and specific activity of animal feed, forage, and soil	CONSTANT(none)
Default value used		Value 1.00E+00
xf(1):Beef Forage Contaminated Fraction	Fraction of forage consumed by beef cattle that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xf(2):Poultry Forage Contaminated Fraction	Fraction of forage consumed by poultry that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xf(3):Milk Cow Forage Contaminated Fraction	Fraction of forage consumed by milk cows that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xf(4):Layer Hen Forage Contaminated Fraction	Fraction of forage consumed by layer hens that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xg(1):Beef Grain Contaminated Fraction	Fraction of stored grain consumed by beef cattle that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xg(2):Poultry Grain Contaminated Fraction	Fraction of stored grain consumed by poultry that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xg(3):Milk Cow Grain Contaminated Fraction	Fraction of stored grain consumed by milk cows that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xg(4):Layer Hen Grain Contaminated Fraction	Fraction of stored grain that is consumed by layer hens that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xh(1):Beef Hay Contaminated Fraction	Fraction of stored hay consumed by beef cattle that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xh(2):Poultry Hay Contaminated Fraction	Fraction of stored hay consumed by poultry that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xh(3):Milk Cow Hay Contaminated Fraction	Fraction of stored hay consumed by milk cows that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xh(4):Layer Hen Hay Contaminated Fraction	Fraction of stored hay consumed by layer hens that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xw(1):Beef Water Contaminated Fraction	Fraction of water that is consumed by beef cattle that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
		CONSTANT(none)

xw(2):Poultry Water Contaminated Fraction	Fraction of water consumed by poultry that is contaminated	
Default value used		Value 1.00E+00
xw(3):Milk Cow Water Contaminated Fraction	Fraction of water consumed by milk cows that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xw(4):Layer Hen Water Contaminated Fraction	Fraction of water consumed by layer hens that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
DIET:Garden Diet	Fraction of human diet grown onsite	CONSTANT(none)
Default value used		Value 1.00E+00
Uv(1):Diet - Leafy	Yearly human consumption of leafy vegetables	CONSTANT(kg/y)
Default value used		Value 2.14E+01
Uv(2):Diet - Roots	Yearly human consumption of other vegetables	CONSTANT(kg/y)
Default value used		Value 4.46E+01
Uv(3):Diet - Fruit	Yearly human consumption of fruits	CONSTANT(kg/y)
Default value used		Value 5.28E+01
Uv(4):Diet - Grain	Yearly human consumption of grains	CONSTANT(kg/y)
Default value used		Value 1.44E+01
Ua(1):Diet - Beef	Yearly human consumption of beef	CONSTANT(kg/y)
Default value used		Value 3.98E+01
Ua(2):Diet - Poultry	Yearly human consumption of poultry	CONSTANT(kg/y)
Default value used		Value 2.53E+01
Ua(3):Diet - Milk	Yearly human consumption of milk	CONSTANT(L/y)
Default value used		Value 2.33E+02
Ua(4):Diet - Egg	Yearly human consumption of eggs	CONSTANT(kg/y)
Default value used		Value 1.91E+01
Uf:Diet - Fish	Yearly human consumption of fish produced from an onsite pond	CONSTANT(kg/y)
Default value used		Value 2.06E+01
tf:Consumption Period	Consumption period for fish	CONSTANT(days)
Default value used		Value 3.65E+02
tcv(1):Consumption Period - Leafy	Food consumption period for leafy vegetables	CONSTANT(days)
Default value used		Value 3.65E+02
tcv(2):Consumption Period - Roots	Food consumption period for other vegetables	CONSTANT(days)
Default value used		Value 3.65E+02
tcv(3):Consumption Period - Fruit	Food consumption period for fruits	CONSTANT(days)
Default value used		Value 3.65E+02
tcv(4):Consumption Period - Grain	Food consumption period for grains	CONSTANT(days)

Default value used		Value 3.65E+02
tca(1):Consumption Period - Beef	Food consumption period for beef	CONSTANT(days)
Default value used		Value 3.65E+02
tca(2):Consumption Period - Poultry	Food consumption period for poultry	CONSTANT(days)
Default value used		Value 3.65E+02
tca(3):Consumption Period - Milk	Food consumption period for milk	CONSTANT(days)
Default value used		Value 3.65E+02
tca(4):Consumption Period - Egg	Food consumption period for eggs	CONSTANT(days)
Default value used		Value 3.65E+02
Nunsat:Number of Unsaturated Layers	Number of model layers used to represent the unsaturated zone	CONSTANT(none)
Default value used		Value 1.00E+01
TstartR:Start Time	The start time of the scenario in days	CONSTANT(days)
Default value used		Value 0.00E+00
TendR:End Time	The ending time of the scenario in days	CONSTANT(days)
Default value used		Value 3.65E+05
dtR:Time Step Size	The time step size	CONSTANT(days)
Default value used		Value 3.65E+02
PstepR:Print Step Size	The time steps for the history file. Doses will be written to the history file every n time steps	CONSTANT(none)
Default value used		Value 1.00E+00
TI:Indoor Exposure Period	The time the resident spends indoors	CONSTANT(days/year)
Default value used		Value 2.40E+02
TX:Outdoor Exposure Period	The time the resident spends outdoors	CONSTANT(days/year)
Default value used		Value 4.02E+01
TG:Gardening Period	The time the resident spends gardening	CONSTANT(days/year)
Default value used		Value 2.92E+00
TTR:Total time in period	Total time in the one year exposure period	CONSTANT(days/year)
Default value used		Value 3.65E+02
SFI:Indoor Shielding Factor	Shielding factor for the residence	CONSTANT(none)
Default value used		Value 5.52E-01
SFO:Outdoor Shielding Factor	Shielding factor for the cover soil	CONSTANT(none)
Default value used		Value 1.00E+00
PD:Floor dust loading	Floor dust loading	UNIFORM(g/m**2)
Default value used		Lower Limit 2.00E-02 Upper Limit 3.00E-01

RFR:Indoor Resuspension Factor	Resuspension factor for indoor dust	LOGUNIFORM(1/m)
Default value used		Lower Limit 1.00E-07 Upper Limit 8.00E-05
CDO:Outdoor Dust Loading	Average dust loading outdoors	LOGUNIFORM(g/m**3)
Default value used		Lower Limit 1.00E-07 Upper Limit 1.00E-04
CDI:Indoor Dust Loading	Average dust loading indoors	DERIVED(g/m**3)
Default value used		
PF:Indoor/Outdoor Penetration Factor	Fraction of outdoor dust in indoor air	UNIFORM(none)
Default value used		Lower Limit 2.00E-01 Upper Limit 7.00E-01
CDG:Gardening Dust Loading	Average dust loading while gardening	UNIFORM(g/m**3)
Default value used		Lower Limit 1.00E-04 Upper Limit 7.00E-04
VR:Indoor Breathing Rate	Breathing rate while indoors	CONSTANT(m**3/hr)
Default value used		Value 9.00E-01
VX:Outdoor Breathing Rate	Breathing rate while outdoors	CONSTANT(m**3/hr)
Default value used		Value 1.40E+00
VG:Gardening Breathing Rate	Breathing rate while gardening	CONSTANT(m**3/hr)
Default value used		Value 1.70E+00
GR:Soil Ingestion Transfer Rate	Average rate of soil ingestion	CONSTANT(g/d)
Default value used		Value 5.00E-02
UW:Diet - Water	Drinking water ingestion rate	CONSTANT(L/d)
Default value used		Value 1.26E+00
H1:Surface Soil Thickness	Thickness of the surface soil layer	CONSTANT(m)
Default value used		Value 1.50E-01
H2:Unsaturated Zone Thickness	Thickness of the unsaturated zone	CONTINUOUS LINEAR(m)
Default value used		Value Probability 3.05E-01 0.00E+00 6.68E-01 4.76E-03 8.11E-01 9.52E-03 9.21E-01 1.43E-02 9.94E-01 1.91E-02 1.03E+00 2.38E-02 1.07E+00 2.86E-02 1.14E+00 3.33E-02 1.21E+00 3.81E-02 1.30E+00 4.29E-02 1.31E+00 4.76E-02 1.32E+00 5.24E-02

1.56E+00	5.71E-02
1.58E+00	6.19E-02
1.61E+00	6.67E-02
1.69E+00	7.62E-02
1.78E+00	8.57E-02
1.80E+00	9.05E-02
1.81E+00	9.52E-02
1.84E+00	1.00E-01
1.87E+00	1.05E-01
1.92E+00	1.10E-01
2.04E+00	1.14E-01
2.10E+00	1.19E-01
2.11E+00	1.24E-01
2.32E+00	1.29E-01
2.36E+00	1.33E-01
2.37E+00	1.38E-01
2.39E+00	1.43E-01
2.44E+00	1.48E-01
2.44E+00	1.52E-01
2.45E+00	1.57E-01
2.59E+00	1.62E-01
2.63E+00	1.67E-01
2.69E+00	1.71E-01
2.79E+00	1.76E-01
2.81E+00	1.81E-01
2.90E+00	1.86E-01
2.95E+00	1.91E-01
3.07E+00	1.95E-01
3.18E+00	2.00E-01
3.22E+00	2.05E-01
3.30E+00	2.10E-01
3.34E+00	2.14E-01
3.37E+00	2.19E-01
3.44E+00	2.24E-01
3.58E+00	2.29E-01
3.62E+00	2.33E-01
3.66E+00	2.38E-01
3.74E+00	2.43E-01
3.86E+00	2.48E-01
3.88E+00	2.52E-01
4.17E+00	2.57E-01
4.26E+00	2.62E-01
4.44E+00	2.71E-01
4.63E+00	2.76E-01
4.87E+00	2.81E-01
5.13E+00	2.86E-01
5.18E+00	2.91E-01
5.54E+00	2.95E-01
5.83E+00	3.00E-01
5.86E+00	3.05E-01
5.86E+00	3.10E-01
5.90E+00	3.14E-01
6.06E+00	3.19E-01
6.13E+00	3.24E-01
6.17E+00	3.29E-01
6.22E+00	3.33E-01
6.31E+00	3.38E-01
6.36E+00	3.43E-01
6.40E+00	3.48E-01
6.46E+00	3.52E-01
6.51E+00	3.57E-01
6.55E+00	3.62E-01

6.60E+00	3.67E-01
6.86E+00	3.71E-01
6.93E+00	3.76E-01
6.95E+00	3.86E-01
6.97E+00	3.91E-01
7.09E+00	3.95E-01
7.18E+00	4.00E-01
7.35E+00	4.05E-01
7.36E+00	4.10E-01
7.40E+00	4.14E-01
7.43E+00	4.19E-01
7.46E+00	4.24E-01
7.59E+00	4.29E-01
7.60E+00	4.33E-01
7.64E+00	4.38E-01
7.87E+00	4.43E-01
8.10E+00	4.48E-01
8.28E+00	4.52E-01
8.35E+00	4.57E-01
8.71E+00	4.62E-01
8.71E+00	4.67E-01
8.73E+00	4.71E-01
8.79E+00	4.76E-01
8.80E+00	4.81E-01
8.82E+00	4.86E-01
8.85E+00	4.91E-01
8.89E+00	4.95E-01
8.90E+00	5.00E-01
8.99E+00	5.05E-01
9.00E+00	5.10E-01
9.13E+00	5.14E-01
9.14E+00	5.19E-01
9.21E+00	5.24E-01
9.31E+00	5.29E-01
9.55E+00	5.33E-01
9.60E+00	5.38E-01
9.63E+00	5.43E-01
9.86E+00	5.48E-01
1.05E+01	5.52E-01
1.07E+01	5.57E-01
1.13E+01	5.62E-01
1.15E+01	5.67E-01
1.17E+01	5.71E-01
1.20E+01	5.76E-01
1.26E+01	5.81E-01
1.26E+01	5.86E-01
1.28E+01	5.91E-01
1.32E+01	5.95E-01
1.32E+01	6.00E-01
1.34E+01	6.05E-01
1.34E+01	6.10E-01
1.36E+01	6.14E-01
1.37E+01	6.19E-01
1.38E+01	6.24E-01
1.41E+01	6.29E-01
1.45E+01	6.33E-01
1.51E+01	6.38E-01
1.52E+01	6.43E-01
1.61E+01	6.48E-01
1.62E+01	6.52E-01
1.65E+01	6.57E-01
1.66E+01	6.62E-01

1.69E+01	6.67E-01
1.74E+01	6.71E-01
1.82E+01	6.76E-01
1.84E+01	6.81E-01
1.84E+01	6.86E-01
1.87E+01	6.91E-01
1.95E+01	6.95E-01
2.01E+01	7.00E-01
2.07E+01	7.05E-01
2.08E+01	7.10E-01
2.17E+01	7.14E-01
2.24E+01	7.19E-01
2.27E+01	7.24E-01
2.29E+01	7.29E-01
2.29E+01	7.33E-01
2.40E+01	7.38E-01
2.47E+01	7.43E-01
2.60E+01	7.48E-01
2.65E+01	7.52E-01
2.72E+01	7.57E-01
2.73E+01	7.62E-01
2.76E+01	7.67E-01
2.77E+01	7.71E-01
2.78E+01	7.76E-01
2.80E+01	7.81E-01
2.86E+01	7.86E-01
2.94E+01	7.91E-01
3.01E+01	7.95E-01
3.03E+01	8.00E-01
3.06E+01	8.10E-01
3.08E+01	8.14E-01
3.11E+01	8.19E-01
3.17E+01	8.24E-01
3.17E+01	8.29E-01
3.17E+01	8.33E-01
3.22E+01	8.38E-01
3.39E+01	8.43E-01
3.48E+01	8.48E-01
3.54E+01	8.52E-01
3.60E+01	8.57E-01
3.68E+01	8.62E-01
4.03E+01	8.67E-01
4.07E+01	8.71E-01
4.24E+01	8.76E-01
4.29E+01	8.81E-01
4.42E+01	8.86E-01
4.72E+01	8.91E-01
4.97E+01	8.95E-01
5.12E+01	9.00E-01
6.13E+01	9.05E-01
6.19E+01	9.10E-01
6.23E+01	9.14E-01
6.32E+01	9.19E-01
6.59E+01	9.24E-01
6.73E+01	9.29E-01
7.47E+01	9.33E-01
7.92E+01	9.38E-01
8.12E+01	9.43E-01
8.28E+01	9.48E-01
8.47E+01	9.52E-01
8.96E+01	9.57E-01
9.47E+01	9.62E-01

		1.08E+02 9.67E-01 1.13E+02 9.71E-01 1.15E+02 9.76E-01 1.42E+02 9.81E-01 1.77E+02 9.86E-01 1.78E+02 9.91E-01 1.80E+02 9.95E-01 3.16E+02 1.00E+00
N1:Surface Soil Porosity	Porosity of the surface soil layer	DERIVED(none)
Default value used		
N2:Unsaturated Zone Porosity	Porosity of the unsaturated zone	DERIVED(none)
Default value used		
F1:Surface Soil Saturation	Saturation ratio of the surface soil layer	DERIVED(none)
Default value used		
F2:Unsaturated Zone Saturation	Saturation ratio of the unsaturated zone	DERIVED(none)
Default value used		
INFIL:Infiltration Rate	Net rate of infiltration to aquifer	DERIVED(m/y)
Default value used		
SCSST:Soil Classification	SCS soil classification ID	DISCRETE CUMULATIVE(none)
Default value used		Value Probability 1.00E+00 1.00E-04 2.00E+00 1.34E-03 3.00E+00 1.06E-02 4.00E+00 2.51E-02 5.00E+00 6.17E-02 6.00E+00 1.09E-01 7.00E+00 1.62E-01 8.00E+00 2.12E-01 9.00E+00 2.85E-01 1.00E+01 5.10E-01 1.10E+01 7.58E-01 1.20E+01 1.00E+00
NDEV:Porosity Probability	Relative porosity value within the distribution for this soil type	UNIFORM(none)
Default value used		Lower Limit 0.00E+00 Upper Limit 1.00E+00
KSDEV:Permeability Probability	Relative permeability value within the distribution for this soil type	UNIFORM(none)
Default value used		Lower Limit 0.00E+00 Upper Limit 1.00E+00
BDEV:Parameter "b" Probability	Relative value of "b" parameter within the distribution for this soil type	UNIFORM(none)
Default value used		Lower Limit 0.00E+00 Upper Limit 1.00E+00
AP:Water Application Rate	Total water application rate on cultivated area	CONTINUOUS LINEAR(m/y)
Default value used		Value Probability 6.07E-01 0.00E+00

		6.10E-01 4.62E-01
		6.35E-01 4.76E-01
		7.62E-01 5.40E-01
		8.89E-01 6.29E-01
		1.02E+00 7.05E-01
		1.14E+00 8.04E-01
		1.27E+00 8.79E-01
		1.40E+00 9.41E-01
		1.52E+00 9.82E-01
		1.65E+00 9.98E-01
		1.78E+00 1.00E+00
IR:Irrigation Rate	Annual average irrigation rate	CONSTANT(L/m**2-d)
Default value used		Value 1.29E+00
RHO1:Surface Soil Density	Bulk density of soil in the surface soil layer	DERIVED(g/mL)
Default value used		
RHO2:Unsaturated Zone Density	Bulk density of soil in the unsaturated zone	DERIVED(g/mL)
Default value used		
Ksat1:Surface Soil Permeabiliy	Saturated permeability of the surface soil layer	DERIVED(cm/sec)
Default value used		
VDR:Volume of Water Consumed	Volume of water withdrawn for consumptive use	CONSTANT(L)
Default value used		Value 1.18E+05
VSW:Volume of Water in Pond	Volume of water in the pond	CONSTANT(L)
Default value used		Value 1.30E+06
AR:Cultivated Area	Area of land cultivated	DERIVED(m**2)
Default value used		
sh:Soil Moisture Content	Moisture content of soil	DERIVED(none)
Default value used		
TTG:Gardening Period	Total time in gardening period	CONSTANT(days)
Default value used		Value 9.00E+01
TD:Drinking-water consumption period	Drinking-water consumption period	CONSTANT(days)
Default value used		Value 3.65E+02
THV(1):Holdup Period : Leafy	Holdup period for leafy vegetables	CONSTANT(days)
Default value used		Value 1.00E+00
THV(2):Holdup Period : Other vegetables	Holdup period for other vegetables	CONSTANT(days)
Default value used		Value 1.40E+01
THV(3):Holdup Period : Fruits	Holdup period for fruits	CONSTANT(days)
Default value used		Value 1.40E+01
THV(4):Holdup Period : Grains	Holdup period for grains	CONSTANT(days)
Default value used		Value 1.40E+01

THA(1):Holdup Period : Beef	Holdup period for beef	CONSTANT(days)
Default value used		Value 2.00E+01
THA(2):Holdup Period : Poultry	Holdup period for poultry	CONSTANT(days)
Default value used		Value 1.00E+00
THA(3):Holdup Period : Milk	Holdup period for milk	CONSTANT(days)
Default value used		Value 1.00E+00
THA(4):Holdup Period : Eggs	Holdup period for eggs	CONSTANT(days)
Default value used		Value 1.00E+00
TGV(1):Growing Period : Leafy	Minimum growing period for leafy vegetables	CONSTANT(days)
Default value used		Value 4.50E+01
TGV(2):Growing Period : Other vegetables	Minimum growing period for other vegetables	CONSTANT(days)
Default value used		Value 9.00E+01
TGV(3):Growing Period : Fruits	Minimum growing period for fruits	CONSTANT(days)
Default value used		Value 9.00E+01
TGV(4):Growing Period : Grains	Minimum growing period for grains	CONSTANT(days)
Default value used		Value 9.00E+01
TGF(1):Growing Period : Beef Forage	Minimum growing period for forage consumed by beef cattle	CONSTANT(days)
Default value used		Value 3.00E+01
TGF(2):Growing Period : Poultry Forage	Minimum growing period for forage consumed by poultry	DERIVED(days)
Default value used		
TGF(3):Growing Period : Milk Cow Forage	Minimum growing period for forage consumed by milk cows	DERIVED(days)
Default value used		
TGF(4):Growing Period : Layer Hen Forage	Minimum growing period for forage consumed by layer hens	DERIVED(days)
Default value used		
TGG(1):Growing Period : Beef Cow Grain	Minimum growing period for stored grain consumed by beef cattle	CONSTANT(days)
Default value used		Value 9.00E+01
TGG(2):Growing Period : Poultry Grain	Minimum growing period for stored grain consumed by poultry	DERIVED(days)
Default value used		
TGG(3):Growing Period : Milk Cow Grain	Minimum growing period for stored grain consumed by milk cows	DERIVED(days)
Default value used		

TGG(4):Growing Period : Layer Hen Grain	Minimum growing period for stored grain consumed by layer hens	DERIVED(days)
Default value used		
TGH(1):Growing Period : Beef Cow Hay	Minimum growing period for stored hay consumed by beef cattle	CONSTANT(days)
Default value used		Value 4.50E+01
TGH(2):Growing Period : Poultry Hay	Minimum growing period for stored hay consumed by poultry	DERIVED(days)
Default value used		
TGH(3):Growing Period : Milk Cow Hay	Minimum growing period for stored hay consumed by milk cows	DERIVED(days)
Default value used		
TGH(4):Growing Period : Layer Hen Hay	Minimum growing period for stored hay consumed by layer hens	DERIVED(days)
Default value used		
RV(1):Interception Fraction : Leafy	Interception fraction for leafy vegetables	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RV(2):Interception Fraction : Other vegetables	Interception fraction for other vegetables	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RV(3):Interception Fraction : Fruits	Interception fraction for fruits	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RV(4):Interception Fraction : Grains	Interception fraction for grains	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RF(1):Interception Fraction : Beef Forage	Interception fraction for beef cattle forage	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RF(2):Interception Fraction : Poultry forage	Interception fraction for poultry forage	DERIVED(none)
Default value used		
RF(3):Interception Fraction : Milk Cow Forage	Interception fraction for milk cow forage	DERIVED(none)
Default value used		
RF(4):Interception Fraction : Layer Hen Forage	Interception fraction for layer hen forage	DERIVED(none)
Default value used		
		UNIFORM(none)

RG(1):Interception Fraction : Beef Cow Grain	Interception fraction for beef cattle grain	
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RG(2):Interception Fraction : Poultry Grain	Interception fraction for poultry grain	DERIVED(none)
Default value used		
RG(3):Interception Fraction : Milk Cow Grain	Interception fraction for milk cow grain	DERIVED(none)
Default value used		
RG(4):Interception Fraction : Layer Hen Grain	Interception fraction for layer hen grain	DERIVED(none)
Default value used		
RH(1):Interception Fraction : Beef Cow Hay	Interception fraction for beef cattle hay	DERIVED(none)
Default value used		
RH(2):Interception Fraction : Poultry Hay	Interception fraction for poultry hay	DERIVED(none)
Default value used		
RH(3):Interception Fraction : Milk Cow Hay	Interception fraction for milk cow hay	DERIVED(none)
Default value used		
RH(4):Interception Fraction : Layer Hen Hay	Interception fraction for layer hen hay	DERIVED(none)
Default value used		
YV(1):Crop Yield : Leafy	Crop yield for leafy vegetables	CONTINUOUS LINEAR(kg wet wt/m**2)

Default value used

Value	Probability
2.70E+00	0.00E+00
2.71E+00	1.60E-03
2.74E+00	6.00E-03
2.76E+00	1.76E-02
2.78E+00	4.36E-02
2.80E+00	8.48E-02
2.82E+00	1.56E-01
2.85E+00	2.57E-01
2.87E+00	3.64E-01
2.89E+00	5.00E-01
2.91E+00	6.39E-01
2.93E+00	7.46E-01
2.96E+00	8.42E-01
2.98E+00	9.09E-01
3.00E+00	9.60E-01
3.02E+00	9.84E-01
3.04E+00	9.94E-01
3.07E+00	9.97E-01
3.09E+00	9.99E-01
3.11E+00	1.00E+00
3.13E+00	1.00E+00
3.15E+00	1.00E+00

YV(2):Crop Yield : Other	Crop yield for other vegetables	CONTINUOUS LINEAR(kg wet wt/m**2)

Default value used

Value	Probability
2.26E+00	0.00E+00
2.29E+00	8.00E-04
2.30E+00	1.20E-03
2.31E+00	6.40E-03
2.33E+00	1.52E-02
2.34E+00	3.28E-02
2.35E+00	7.44E-02
2.36E+00	1.40E-01
2.38E+00	2.49E-01
2.39E+00	3.80E-01
2.40E+00	5.30E-01
2.42E+00	6.61E-01
2.43E+00	7.88E-01
2.44E+00	8.86E-01
2.45E+00	9.42E-01
2.47E+00	9.75E-01
2.48E+00	9.88E-01
2.49E+00	9.96E-01
2.51E+00	9.97E-01
2.52E+00	9.99E-01
2.53E+00	1.00E+00
2.54E+00	1.00E+00

YV(3):Crop Yield : Fruits	Crop yield for fruits	CONTINUOUS LINEAR(kg wet wt/m**2)

Default value used

Value	Probability
2.17E+00	0.00E+00
2.20E+00	1.20E-03
2.21E+00	2.40E-03
2.23E+00	6.80E-03
2.25E+00	1.80E-02
2.27E+00	4.36E-02
2.29E+00	7.64E-02
2.31E+00	1.38E-01
2.32E+00	2.14E-01
2.34E+00	3.27E-01
2.36E+00	4.50E-01
2.38E+00	5.76E-01
2.40E+00	6.87E-01
2.42E+00	7.88E-01
2.43E+00	8.68E-01
2.45E+00	9.25E-01
2.47E+00	9.60E-01
2.49E+00	9.81E-01
2.51E+00	9.92E-01
2.53E+00	9.98E-01
2.54E+00	1.00E+00
2.56E+00	1.00E+00

YV(4):Crop Yield : Grains	Crop yield for grains	CONTINUOUS LINEAR(kg wet wt/m**2)

Default value used

Value	Probability
2.85E-01	0.00E+00
2.90E-01	6.00E-04
3.02E-01	2.80E-03
3.14E-01	9.40E-03
3.26E-01	2.14E-02
3.38E-01	5.42E-02

		3.50E-01 1.08E-01 3.62E-01 2.02E-01 3.74E-01 3.15E-01 3.86E-01 4.50E-01 3.98E-01 5.92E-01 4.10E-01 7.20E-01 4.23E-01 8.26E-01 4.35E-01 9.03E-01 4.47E-01 9.51E-01 4.59E-01 9.77E-01 4.71E-01 9.91E-01 4.83E-01 9.96E-01 4.95E-01 9.99E-01 5.07E-01 1.00E+00 5.19E-01 1.00E+00 5.31E-01 1.00E+00
YF(1):Crop Yield : Beef Forage	Crop yield for beef cattle forage	BETA(kg dry wt forage/m**2)
Default value used		Lower Limit 3.70E-01 Upper Limit 5.24E-01 p 2.36E+00 q 1.40E+00
YF(2):Crop Yield : Poultry Forage	Crop yield for poultry forage	DERIVED(kg wet wt forage/m**2)
Default value used		
YF(3):Crop Yield : Milk Cow Forage	Crop yield for milk cow forage	DERIVED(kg wet wt forage/m**2)
Default value used		
YF(4):Crop Yield : Layer Hen Forage	Crop yield for layer hen forage	DERIVED(kg wet wt forage/m**2)
Default value used		
YG(1):Crop Yield : Beef Cow Grain	Crop yield for beef cattle grain	NORMAL(kg dry wt grain /m**2)
Default value used		Mean 5.78E-01 Standard Deviation 7.77E-02
YG(2):Crop Yield : Poultry Grain	Crop yield for poultry grain	DERIVED(kg wet wt grain /m**2)
Default value used		
YG(3):Crop Yield : Milk Cow Grain	Crop yield for milk cow grain	DERIVED(kg wet wt grain /m**2)
Default value used		
YG(4):Crop Yield : Layer Hen Grain	Crop yield for layer hen grain	DERIVED(kg wet wt grain /m**2)
Default value used		
YH(1):Crop Yield : Beef Cow Hay	Crop yield for beef cattle hay	DERIVED(kg wet wt/m**2)
Default value used		
YH(2):Crop Yield : Poultry Hay	Crop yield for poultry hay	DERIVED(kg wet wt/m**2)
Default value used		
YH(3):Crop Yield : Milk Cow Hay	Crop yield for milk cow hay	DERIVED(kg wet wt/m**2)

Default value used		
YH(4):Crop Yield : Layer Hen Hay	Crop yield for layer hen hay	DERIVED(kg wet wt/m**2)
Default value used		
WV(1):Wet/dry : Leafy Vegetables	Wet/dry conversion factor for leafy vegetables	CONTINUOUS LINEAR(none)

Default value used

Value	Probability
3.32E-02	0.00E+00
4.89E-02	3.45E-02
5.47E-02	6.91E-02
5.96E-02	1.04E-01
6.36E-02	1.38E-01
6.70E-02	1.73E-01
7.05E-02	2.07E-01
7.38E-02	2.42E-01
7.48E-02	2.50E-01
7.72E-02	2.76E-01
8.03E-02	3.11E-01
8.34E-02	3.45E-01
8.66E-02	3.80E-01
9.00E-02	4.15E-01
9.36E-02	4.49E-01
9.73E-02	4.84E-01
9.91E-02	4.99E-01
1.01E-01	5.18E-01
1.05E-01	5.53E-01
1.09E-01	5.87E-01
1.13E-01	6.22E-01
1.18E-01	6.56E-01
1.23E-01	6.91E-01
1.29E-01	7.25E-01
1.33E-01	7.50E-01
1.35E-01	7.60E-01
1.42E-01	7.94E-01
1.50E-01	8.29E-01
1.59E-01	8.64E-01
1.70E-01	8.98E-01
1.85E-01	9.33E-01
2.10E-01	9.67E-01
2.56E-01	9.91E-01
3.24E-01	1.00E+00

WV(2):Wet/dry : Other Vegetables	Wet/dry conversion factor for other vegetables	CONTINUOUS LINEAR(none)

Default value used

Value	Probability
3.58E-02	0.00E+00
4.87E-02	3.45E-02
5.46E-02	6.91E-02
5.90E-02	1.04E-01
6.29E-02	1.38E-01
6.69E-02	1.73E-01
7.02E-02	2.07E-01
7.34E-02	2.42E-01
7.41E-02	2.50E-01
7.65E-02	2.76E-01
7.99E-02	3.11E-01
8.32E-02	3.45E-01
8.66E-02	3.80E-01
9.05E-02	4.15E-01
9.41E-02	4.49E-01

		9.82E-02 4.84E-01 9.98E-02 4.99E-01 1.02E-01 5.18E-01 1.06E-01 5.53E-01 1.09E-01 5.87E-01 1.14E-01 6.22E-01 1.19E-01 6.56E-01 1.24E-01 6.91E-01 1.29E-01 7.25E-01 1.33E-01 7.50E-01 1.35E-01 7.60E-01 1.42E-01 7.94E-01 1.50E-01 8.29E-01 1.59E-01 8.64E-01 1.70E-01 8.98E-01 1.87E-01 9.33E-01 2.12E-01 9.67E-01 2.62E-01 9.91E-01 3.13E-01 1.00E+00
WV(3):Wet/dry : Fruit	Wet/dry conversion factor for fruits	CONTINUOUS LINEAR(none)
Default value used		Value Probability 3.66E-02 0.00E+00 4.87E-02 3.45E-02 5.45E-02 6.91E-02 5.93E-02 1.04E-01 6.31E-02 1.38E-01 6.72E-02 1.73E-01 7.10E-02 2.07E-01 7.44E-02 2.42E-01 7.52E-02 2.50E-01 7.78E-02 2.76E-01 8.13E-02 3.11E-01 8.45E-02 3.45E-01 8.78E-02 3.80E-01 9.11E-02 4.15E-01 9.46E-02 4.49E-01 9.82E-02 4.84E-01 9.97E-02 4.99E-01 1.02E-01 5.18E-01 1.06E-01 5.53E-01 1.10E-01 5.87E-01 1.14E-01 6.22E-01 1.19E-01 6.56E-01 1.24E-01 6.91E-01 1.29E-01 7.25E-01 1.34E-01 7.50E-01 1.35E-01 7.60E-01 1.42E-01 7.94E-01 1.49E-01 8.29E-01 1.58E-01 8.64E-01 1.70E-01 8.98E-01 1.87E-01 9.33E-01 2.14E-01 9.67E-01 2.58E-01 9.91E-01 3.25E-01 1.00E+00
WV(4):Wet/dry : Grain	Wet/dry conversion factor for grains	CONSTANT(none)
Default value used		Value 8.80E-01
WF(1):Wet/dry : Beef Cow Forage	Wet/dry conversion factor for beef cattle forage	BETA(none)

Default value used		Lower Limit 1.83E-01 Upper Limit 3.23E-01 p 1.15E+00 q 1.18E+00
WF(2):Wet/dry : Poultry Forage	Wet/dry conversion factor for poultry forage	DERIVED(none)
Default value used		
WF(3):Wet/dry : Milk Cow Forage	Wet/dry conversion factor for milk cow forage	DERIVED(none)
Default value used		
WF(4):Wet/dry : Layer Hen Forage	Wet/dry conversion factor for layer hen forage	DERIVED(none)
Default value used		
WG(1):Wet/dry : Beef Cow Grain	Wet/dry conversion factor for beef cattle grain	CONSTANT(none)
Default value used		Value 8.80E-01
WG(2):Wet/dry : Poultry Grain	Wet/dry conversion factor for poultry grain	DERIVED(none)
Default value used		
WG(3):Wet/dry : Milk Cow Grain	Wet/dry conversion factor for milk cow grain	DERIVED(none)
Default value used		
WG(4):Wet/dry : Layer Hen Grain	Wet/dry conversion factor for layer hen grain	DERIVED(none)
Default value used		
WH(1):Wet/dry : Beef Cow Hay	Wet/dry conversion factor for beef cattle hay	DERIVED(none)
Default value used		
WH(2):Wet/dry : Poultry Hay	Wet/dry conversion factor for poultry hay	DERIVED(none)
Default value used		
WH(3):Wet/dry : Milk Cow Hay	Wet/dry conversion factor for milk cow hay	DERIVED(none)
Default value used		
WH(4):Wet/dry : Layer Hen Hay	Wet/dry conversion factor for layer hen hay	DERIVED(none)
Default value used		
QF(1):Ingestion Rate : Beef Cow Forage	Ingestion rate for beef cattle forage	BETA(kg dry wt forage/d)
Default value used		Lower Limit 1.69E+00 Upper Limit 2.29E+00 p 1.99E+00 q 9.11E-01
QF(2):Ingestion Rate : Poultry Forage	Ingestion rate for poultry forage	BETA(kg dry wt forage/d)
Default value used		Lower Limit 3.48E-03 Upper Limit 2.82E-02 p 1.51E+00 q 1.41E+00
	Ingestion rate for milk cow forage	

QF(3):Ingestion Rate : Milk Cow Forage		CONTINUOUS LINEAR(kg dry wt forage/d)

Default value used

Value	Probability
6.35E+00	0.00E+00
6.77E+00	3.45E-02
6.96E+00	6.91E-02
7.10E+00	1.04E-01
7.24E+00	1.38E-01
7.35E+00	1.73E-01
7.47E+00	2.07E-01
7.57E+00	2.42E-01
7.60E+00	2.50E-01
7.67E+00	2.76E-01
7.77E+00	3.11E-01
7.87E+00	3.45E-01
7.98E+00	3.80E-01
8.08E+00	4.15E-01
8.18E+00	4.49E-01
8.31E+00	4.84E-01
8.37E+00	4.99E-01
8.42E+00	5.18E-01
8.54E+00	5.53E-01
8.67E+00	5.87E-01
8.81E+00	6.22E-01
8.95E+00	6.56E-01
9.10E+00	6.91E-01
9.26E+00	7.25E-01
9.38E+00	7.50E-01
9.45E+00	7.60E-01
9.68E+00	7.94E-01
9.93E+00	8.29E-01
1.02E+01	8.64E-01
1.06E+01	8.98E-01
1.11E+01	9.33E-01
1.20E+01	9.67E-01
1.33E+01	9.91E-01
1.53E+01	1.00E+00

QF(4):Ingestion Rate : Layer Hen Forage	Ingestion rate for layer hen forage	BETA(kg dry wt forage/d)

Default value used

Lower Limit	1.19E-02
Upper Limit	2.22E-02
p	1.45E+00
q	7.92E-01

QG(1):Ingestion Rate : Beef Cattle Grain	Ingestion rate for beef cattle grain	BETA(kg dry wt grain/d)

Default value used

Lower Limit	1.69E+00
Upper Limit	2.29E+00
p	1.99E+00
q	9.11E-01

QG(2):Ingestion Rate : Poultry Grain	Ingestion rate for poultry grain	BETA(kg dry wt grain/d)

Default value used

Lower Limit	1.04E-02
Upper Limit	8.45E-02
p	1.51E+00
q	1.41E+00

QG(3):Ingestion Rate : Milk Cow Grain	Ingestion rate for milk cow grain	NORMAL(kg dry wt grain/d)

Default value used		Mean 1.71E+00 Standard Deviation 2.62E-01
QG(4):Ingestion Rate : Layer Hen Grain	Ingestion rate for layer hen grain	BETA(kg dry wt grain/d)
Default value used		Lower Limit 3.58E-02 Upper Limit 6.67E-02 p 1.43E+00 q 7.92E-01
QH(1):Ingestion Rate : Beef Cattle Hay	Ingestion rate for beef cattle hay	BETA(kg dry wt hay/d)
Default value used		Lower Limit 3.38E+00 Upper Limit 4.58E+00 p 1.99E+00 q 9.11E-01
QH(2):Ingestion Rate : Poultry Hay	Ingestion rate for poultry hay	CONSTANT(kg dry wt hay/d)
Default value used		Value 0.00E+00
QH(3):Ingestion Rate : Milk Cow Hay	Ingestion rate for milk cow hay	CONTINUOUS LINEAR(kg dry wt hay/d)
Default value used		Value / Probability 5.12E+00 / 0.00E+00 5.43E+00 / 3.45E-02 5.57E+00 / 6.91E-02 5.68E+00 / 1.04E-01 5.79E+00 / 1.38E-01 5.89E+00 / 1.73E-01 5.98E+00 / 2.07E-01 6.06E+00 / 2.42E-01 6.08E+00 / 2.50E-01 6.14E+00 / 2.76E-01 6.22E+00 / 3.11E-01 6.30E+00 / 3.45E-01 6.38E+00 / 3.80E-01 6.46E+00 / 4.15E-01 6.54E+00 / 4.49E-01 6.63E+00 / 4.84E-01 6.67E+00 / 4.99E-01 6.72E+00 / 5.18E-01 6.81E+00 / 5.53E-01 6.92E+00 / 5.87E-01 7.03E+00 / 6.22E-01 7.13E+00 / 6.56E-01 7.26E+00 / 6.91E-01 7.39E+00 / 7.25E-01 7.49E+00 / 7.50E-01 7.56E+00 / 7.60E-01 7.70E+00 / 7.94E-01 7.89E+00 / 8.29E-01 8.11E+00 / 8.64E-01 8.39E+00 / 8.98E-01 8.75E+00 / 9.33E-01 9.44E+00 / 9.67E-01 1.05E+01 / 9.91E-01 1.27E+01 / 1.00E+00
QH(4):Ingestion Rate : Layer Hen Hay	Ingestion rate for layer hen hay	CONSTANT(kg dry wt hay/d)
Default value used		Value 0.00E+00

QW(1):Water Rate : Beef Cattle	Water ingestion rate for beef cattle	CONSTANT(L/d)
Default value used		Value 5.00E+01
QW(2):Water Rate : Poultry	Water ingestion rate for poultry	CONSTANT(L/d)
Default value used		Value 3.00E-01
QW(3):Water Rate : Milk Cows	Water ingestion rate for milk cows	CONSTANT(L/d)
Default value used		Value 6.00E+01
QW(4):Water Rate : Layer Hens	Water ingestion rate for layer hens	CONSTANT(L/d)
Default value used		Value 3.00E-01
QD(1):Soil Fraction : Beef Cattle	Soil intake fraction for beef cattle	CONSTANT(none)
Default value used		Value 2.00E-02
QD(2):Soil Fraction : Poultry	Soil intake fraction for poultry	CONSTANT(none)
Default value used		Value 1.00E-01
QD(3):Soil Fraction : Milk Cows	Soil intake fraction for milk cows	CONSTANT(none)
Default value used		Value 2.00E-02
QD(4):Soil Fraction : Layer Hens	Soil intake fraction for layer hens	CONSTANT(none)
Default value used		Value 1.00E-01
MLV(1):Mass-Loading : Leafy Vegetables	Mass-loading factor for leafy vegetables	CONSTANT(none)
Default value used		Value 1.00E-01
MLV(2):Mass-Loading : Other Vegetables	Mass-loading factor for other vegetables	CONSTANT(none)
Default value used		Value 1.00E-01
MLV(3):Mass-Loading : Fruits	Mass-loading factor for fruits	CONSTANT(none)
Default value used		Value 1.00E-01
MLV(4):Mass-Loading : Grains	Mass-loading factor for grains	CONSTANT(none)
Default value used		Value 1.00E-01
LAMBDW:Weathering Rate	Weathering rate for activity removal from plants	CONSTANT(1/d)
Default value used		Value 4.95E-02
MLF(1):Mass-Loading : Beef Cow Forage	Mass-loading factor for beef cattle forage	CONSTANT(none)
Default value used		Value 1.00E-01
MLF(2):Mass-Loading : Poultry Forage	Mass-loading factor for poultry forage	CONSTANT(none)
Default value used		Value 1.00E-01
MLF(3):Mass-Loading : Milk Cow Forage	Mass-loading factor for milk cow forage	CONSTANT(none)

Default value used		Value 1.00E-01
MLF(4):Mass-Loading : Layer Hen Forage	Mass-loading factor for layer hen forage	CONSTANT(none)
Default value used		Value 1.00E-01
MLG(1):Mass-Loading : Beef Cattle Grain	Mass-loading factor for beef cattle grain	CONSTANT(none)
Default value used		Value 1.00E-01
MLG(2):Mass-Loading : Poultry Grain	Mass-loading factor for poultry grain	CONSTANT(none)
Default value used		Value 1.00E-01
MLG(3):Mass-Loading : Milk Cow Grain	Mass-loading factor for milk cow grain	CONSTANT(none)
Default value used		Value 1.00E-01
MLG(4):Mass-Loading : Layer Hen Grain	Mass-loading factor for layer hen grain	CONSTANT(none)
Default value used		Value 1.00E-01
MLH(1):Mass-Loading : Beef Cattle Hay	Mass-loading factor for beef cattle hay	CONSTANT(none)
Default value used		Value 1.00E-01
MLH(2):Mass-Loading : Poultry Hay	Mass-loading factor for poultry hay	CONSTANT(none)
Default value used		Value 1.00E-01
MLH(3):Mass-Loading : Milk Cow Hay	Mass-loading factor for milk cow hay	CONSTANT(none)
Default value used		Value 1.00E-01
MLH(4):Mass-Loading : Layer Hen Hay	Mass-loading factor for layer hen hay	CONSTANT(none)
Default value used		Value 1.00E-01
TFF(1):Feeding Period : Beef Cow Forage	Feeding period for beef cattle forage	CONSTANT(days)
Default value used		Value 3.65E+02
TFF(2):Feeding Period : Poultry Forage	Feeding period for poultry forage	CONSTANT(days)
Default value used		Value 3.65E+02
TFF(3):Feeding Period : Milk Cow Forage	Feeding period for milk cow forage	CONSTANT(days)
Default value used		Value 3.65E+02
TFF(4):Feeding Period : Layer Hen Forage	Feeding period for layer hen forage	CONSTANT(days)
Default value used		Value 3.65E+02
TFG(1):Feeding Period : Beef Cattle Grain	Feeding period for beef cattle grain	CONSTANT(days)
Default value used		Value 3.65E+02
TFG(2):Feeding Period : Poultry Grain	Feeding period for poultry grain	CONSTANT(days)
Default value used		Value 3.65E+02
	Feeding period for milk cow grain	CONSTANT(days)

TFG(3):Feeding Period : Milk Cow Grain		
Default value used		Value 3.65E+02
TFG(4):Feeding Period : Layer Hen Grain	Feeding period for layer hen grain	CONSTANT(days)
Default value used		Value 3.65E+02
TFH(1):Feeding Period : Beef Cattle Hay	Feeding period for beef cattle hay	CONSTANT(days)
Default value used		Value 3.65E+02
TFH(2):Feeding Period : Poultry Hay	Feeding period for poultry hay	CONSTANT(days)
Default value used		Value 3.65E+02
TFH(3):Feeding Period : Milk Cow Hay	Feeding period for milk cow hay	CONSTANT(days)
Default value used		Value 3.65E+02
TFH(4):Feeding Period : Layer Hen Hay	Feeding period for layer hen hay	CONSTANT(days)
Default value used		Value 3.65E+02
TFW(1):Water Period : Beef Cattle	Water ingestion period for beef cattle	CONSTANT(days)
Default value used		Value 3.65E+02
TFW(2):Water Period : Poultry	Water ingestion period for poultry	CONSTANT(days)
Default value used		Value 3.65E+02
TFW(3):Water Period : Milk Cows	Water ingestion period for milk cows	CONSTANT(days)
Default value used		Value 3.65E+02
TFW(4):Water Period : Layer Hens	Water ingestion period for layer hens	CONSTANT(days)
Default value used		Value 3.65E+02
fha(1):Hydrogen Fraction : Beef Cattle	Hydrogen fraction for beef cattle	CONSTANT(none)
Default value used		Value 1.00E-01
fha(2):Hydrogen Fraction : Poultry	Hydrogen fraction for poultry	CONSTANT(none)
Default value used		Value 1.00E-01
fha(3):Hydrogen Fraction : Milk Cows	Hydrogen fraction for milk cows	CONSTANT(none)
Default value used		Value 1.10E-01
fha(4):Hydrogen Fraction : Eggs	Hydrogen fraction for eggs	CONSTANT(none)
Default value used		Value 1.10E-01
fhv(1):Hydrogen Fraction : Leafy Vegetables	Hydrogen fraction for leafy vegetables	CONSTANT(none)
Default value used		Value 1.00E-01
	Hydrogen fraction for other vegetables	CONSTANT(none)

fhv(2):Hydrogen Fraction : Other Vegetables		
Default value used		Value 1.00E-01
fhv(3):Hydrogen Fraction : Fruits	Hydrogen fraction for fruits	CONSTANT(none)
Default value used		Value 1.00E-01
fhv(4):Hydrogen Fraction : Grains	Hydrogen fraction for grains	CONSTANT(none)
Default value used		Value 6.80E-02
fhf(1):Hydrogen Fraction : Beef Cow Forage	Hydrogen fraction for beef cattle forage	CONSTANT(none)
Default value used		Value 1.00E-01
fhf(2):Hydrogen Fraction : Poultry Forage	Hydrogen fraction for poultry forage	CONSTANT(none)
Default value used		Value 1.00E-01
fhf(3):Hydrogen Fraction : Milk Cow Forage	Hydrogen fraction for milk cow forage	CONSTANT(none)
Default value used		Value 1.00E-01
fhf(4):Hydrogen Fraction : Layer Hen Forage	Hydrogen fraction for layer hen forage	CONSTANT(none)
Default value used		Value 1.00E-01
fhh(1):Hydrogen Fraction : Beef Cattle Hay	Hydrogen fraction for beef cattle hay	CONSTANT(none)
Default value used		Value 1.00E-01
fhh(2):Hydrogen Fraction : Poultry Hay	Hydrogen fraction for poultry hay	CONSTANT(none)
Default value used		Value 1.00E-01
fhh(3):Hydrogen Fraction : Milk Cow Hay	Hydrogen fraction for milk cow hay	CONSTANT(none)
Default value used		Value 1.00E-01
fhh(4):Hydrogen Fraction : Layer Hen Hay	Hydrogen fraction for layer hen hay	CONSTANT(none)
Default value used		Value 1.00E-01
fhg(1):Hydrogen Fraction : Beef Cattle Grain	Hydrogen fraction for beef cattle grain	CONSTANT(none)
Default value used		Value 6.80E-02
fhg(2):Hydrogen Fraction : Poultry Grain	Hydrogen fraction for poultry grain	CONSTANT(none)
Default value used		Value 6.80E-02
	Hydrogen fraction for milk cow grain	CONSTANT(none)

fhg(3):Hydrogen Fraction : Milk Cow Grain		
Default value used		Value 6.80E-02
fhg(4):Hydrogen Fraction : Layer Hen Grain	Hydrogen fraction for layer hen grain	CONSTANT(none)
Default value used		Value 6.80E-02
fhd016:Hydrogen Fraction : Soil	Fraction of hydrogen in soil	DERIVED(none)
Default value used		
sasvh:Tritium Equivalence: Plant/Soil	Tritium equivalence: plant/soil	CONSTANT(none)
Default value used		Value 1.00E+00
sawvh:Tritium Equivalence: Plant/Water	Tritium equivalence: plant/water	CONSTANT(none)
Default value used		Value 1.00E+00
satah:Tritium Equivalence: Animal Products	Tritium equivalence: animal product intake	CONSTANT(none)
Default value used		Value 1.00E+00
YA(1):Animal Product Yield : Beef Cattle	Annual yield of beef per individual animal	CONSTANT(kg/y)
Default value used		Value 2.09E+02
YA(2):Animal Product Yield : Poultry	Annual yield of chicken per individual animal	CONSTANT(kg/y)
Default value used		Value 1.53E+00
YA(3):Animal Product Yield : Milk Cows	Annual yield of milk per individual animal	CONSTANT(L/y)
Default value used		Value 7.41E+03
YA(4):Animal Product Yield : Layer Hens	Annual yield of eggs per individual animal	CONSTANT(kg/y)
Default value used		Value 1.26E+01
AREXt:External Exposure Area	Minimum surface area to which resident is exposed via external radiation during residential period	CONSTANT(m**2)
Default value used		Value 1.00E+02
ARInh:Inhalation Exposure Area	Minimum surface area to which resident is exposed via inhalation during residential period	CONSTANT(m**2)
Default value used		Value 1.00E+02
ARIng:Secondary Ingestion Exposure Area	Minimum surface area to which resident is exposed via secondary ingestion during residential period	CONSTANT(m**2)
Default value used		Value 1.00E+02
ARAgr:Agricultural Exposure Area	Minimum surface area to which resident is exposed via any agricultural product during residential period	DERIVED(m**2)

Default value used		
ARH2O:Groundwater Exposure Area	Minimum surface area to which resident is exposed via groundwater during residential period	DERIVED(m**2)
Default value used		
ARAll:Exposure Area	Minimum surface area to which resident is exposed via any pathway during the residential period	DERIVED(m**2)
Default value used		

Element Dependant Parameters

Parameter Name	Description	Distribution
Pb:Coefficient	Partition coefficient for Pb	NORMAL(Log10(mL/g))
Default value used		Mean 3.38E+00 Standard Deviation 1.20E+00
Bi:Coefficient	Partition coefficient for Bi	NORMAL(Log10(mL/g))
Default value used		Mean 2.65E+00 Standard Deviation 1.40E+00
Po:Coefficient	Partition coefficient for Po	NORMAL(Log10(mL/g))
Default value used		Mean 2.26E+00 Standard Deviation 7.30E-01
Rn:Coefficient	Partition coefficient for Rn	CONSTANT(mL/g)
Default value used		Value 0.00E+00
Ra:Coefficient	Partition coefficient for Ra	NORMAL(Log10(mL/g))
Default value used		Mean 3.55E+00 Standard Deviation 7.40E-01
Pb:Leafy	Leafy plant concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Mean of Ln(X) -3.10E+00 Standard Deviation of Ln 9.04E-01
Bi:Leafy	Leafy plant concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Mean of Ln(X) -3.35E+00 Standard Deviation of Ln 9.04E-01
Po:Leafy	Leafy plant concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Mean of Ln(X) -5.99E+00 Standard Deviation of Ln 9.04E-01
Rn:Leafy	Leafy plant concentration factor for Rn	CONSTANT(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Value 0.00E+00
Ra:Leafy	Leafy plant concentration factor for Ra	LOGNORMAL-N(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Mean of Ln(X) -4.20E+00 Standard Deviation of Ln 9.04E-01

Pb:Root	Root plant concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Mean of Ln(X) -4.71E+00 Standard Deviation of Ln 9.04E-01
Bi:Root	Root plant concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Mean of Ln(X) -5.30E+00 Standard Deviation of Ln 9.04E-01
Po:Root	Root plant concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Mean of Ln(X) -7.82E+00 Standard Deviation of Ln 9.04E-01
Rn:Root	Root plant concentration factor for Rn	CONSTANT(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Value 0.00E+00
Ra:Root	Root plant concentration factor for Ra	LOGNORMAL-N(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Mean of Ln(X) -6.50E+00 Standard Deviation of Ln 9.04E-01
Pb:Fruit	Fruit concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Mean of Ln(X) -4.71E+00 Standard Deviation of Ln 9.04E-01
Bi:Fruit	Fruit concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Mean of Ln(X) -5.30E+00 Standard Deviation of Ln 9.04E-01
Po:Fruit	Fruit concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Mean of Ln(X) -7.82E+00 Standard Deviation of Ln 9.04E-01
Rn:Fruit	Fruit concentration factor for Rn	CONSTANT(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Value 0.00E+00
Ra:Fruit	Fruit concentration factor for Ra	LOGNORMAL-N(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Mean of Ln(X) -6.50E+00 Standard Deviation of Ln 9.04E-01
Pb:Grain	Grain concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Mean of Ln(X) -4.71E+00 Standard Deviation of Ln 9.04E-01
Bi:Grain	Grain concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Mean of Ln(X) -5.30E+00 Standard Deviation of Ln 9.04E-01
Po:Grain	Grain concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Mean of Ln(X) -7.82E+00 Standard Deviation of Ln 9.04E-01
Rn:Grain	Grain concentration factor for Rn	CONSTANT(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Value 0.00E+00
Ra:Grain	Grain concentration factor for Ra	

		LOGNORMAL-N(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Mean of Ln(X) -6.50E+00 Standard Deviation of Ln 9.04E-01
Pb:Beef	Beef transfer factor for Pb	CONSTANT(d/kg)
Default value used		Value 3.00E-04
Bi:Beef	Beef transfer factor for Bi	CONSTANT(d/kg)
Default value used		Value 4.00E-04
Po:Beef	Beef transfer factor for Po	CONSTANT(d/kg)
Default value used		Value 3.00E-04
Rn:Beef	Beef transfer factor for Rn	CONSTANT(d/kg)
Default value used		Value 0.00E+00
Ra:Beef	Beef transfer factor for Ra	CONSTANT(d/kg)
Default value used		Value 2.50E-04
Pb:Poultry	Poultry transfer factor for Pb	CONSTANT(d/kg)
Default value used		Value 2.00E-01
Bi:Poultry	Poultry transfer factor for Bi	CONSTANT(d/kg)
Default value used		Value 1.00E-01
Po:Poultry	Poultry transfer factor for Po	CONSTANT(d/kg)
Default value used		Value 9.00E-01
Rn:Poultry	Poultry transfer factor for Rn	CONSTANT(d/kg)
Default value used		Value 0.00E+00
Ra:Poultry	Poultry transfer factor for Ra	CONSTANT(d/kg)
Default value used		Value 3.00E-02
Pb:Milk	Milk transfer factor for Pb	CONSTANT(d/L)
Default value used		Value 2.50E-04
Bi:Milk	Milk transfer factor for Bi	CONSTANT(d/L)
Default value used		Value 5.00E-04
Po:Milk	Milk transfer factor for Po	CONSTANT(d/L)
Default value used		Value 3.50E-04
Rn:Milk	Milk transfer factor for Rn	CONSTANT(d/L)
Default value used		Value 0.00E+00
Ra:Milk	Milk transfer factor for Ra	CONSTANT(d/L)
Default value used		Value 4.50E-04
Pb:Eggs	Egg transfer factor for Pb	CONSTANT(d/kg)
Default value used		Value 8.00E-01
Bi:Eggs	Egg transfer factor for Bi	CONSTANT(d/kg)
Default value used		Value 8.00E-01
Po:Eggs	Egg transfer factor for Po	CONSTANT(d/kg)
Default value used		Value 7.00E+00
Rn:Eggs	Egg transfer factor for Rn	CONSTANT(d/kg)
Default value used		Value 0.00E+00
Ra:Eggs	Egg transfer factor for Ra	CONSTANT(d/kg)
Default value used		Value 2.00E-05
Pb:Factor	Bioaccumulation factor for Pb in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)

Default value used		Value 1.00E+02
Bi:Factor	Bioaccumulation factor for Bi in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)
Default value used		Value 1.50E+01
Po:Factor	Bioaccumulation factor for Po in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)
Default value used		Value 5.00E+02
Rn:Factor	Bioaccumulation factor for Rn in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)
Default value used		Value 0.00E+00
Ra:Factor	Bioaccumulation factor for Ra in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)
Default value used		Value 7.00E+01

Correlation Coefficients:

Parameter One	Parameter Two	Correlation Coefficient
KSDEV:Permeability Probability	**BDEV:Parameter "b" Probability**	-0.35
Default value used		
NDEV:Porosity Probability	**BDEV:Parameter "b" Probability**	-0.35
Default value used		

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 5.03E-01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.03E-01 **to** 5.04E-01 **mrem/year**

Detailed Results:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 **quantile value**

Concentration at Time of Peak Dose:

Nuclide	Soil Concentration (pCi/g)	Water Concentration (pCi/g)
226Ra	1.08E-01	1.48E-17
222Rn	1.07E-01	1.83E-09
210Pb	3.99E-02	1.20E-07
210Bi	3.99E-02	1.88E-07
210Po	3.87E-02	9.80E-08

Pathway Dose from All Nuclides (mrem)

		External	Inhalation	

All Pathways Dose	Surface Water			Secondary Ingestion
5.04E-01	1.61E-06	4.99E-01	5.52E-04	6.21E-03

Radionuclide Dose through All Active Pathways (mrem)

Nuclide	All Pathways Dose
226Ra	3.98E-03
222Rn	4.98E-01
210Pb	3.65E-03
210Bi	8.28E-05
210Po	1.31E-03
All Nuclides	5.04E-01

Dose from Each Nuclide through Each Active Pathway (mrem)

Nuclide	Surface Water	External	Inhalation	Secondary Ingestion
226Ra	1.38E-17	1.63E-03	3.02E-04	2.03E-03
222Rn	0.00E+00	4.98E-01	5.07E-07	1.39E-06
210Pb	6.58E-07	4.88E-05	1.50E-04	3.11E-03
210Bi	1.85E-10	6.95E-05	2.16E-06	3.71E-06
210Po	9.53E-07	8.86E-07	1.00E-04	1.07E-03

5. On Page 156, you provide your DandD calculation for the radioactivity in the soil at the gauge building. Please provide some additional justification for the following inputs of the calculation:

   a. You used Ra-226 instead of Ra-226 + C. Please describe why the daughters of Ra-226 were not considered in the calculation for the initial dose as it appears the contamination occurred over a number of years.

      Using the D&D modeling code, Ra-226 was a more conservative selection in our dose calculation versus Ra-226+C. The lower Annual TEDE of the Ra-226+C is the result of the 1st decay product of the Ra-226 decay chain is Rn-222, a gas, and would have dissipated into the atmosphere resulting in a significant reduction in dose since contamination was located in an outside environment. D&D modeling code results are enclosed to support the comparisons. Please see the table below.

Contaminant in soil	*Concentration (pCi/gm)*	*Area (m2)*	*Calculated Annual TEDE*	*Notes*
Ra-226	*40*	*10*	*18.5 mRem*	*1,2*
Ra-226 C	*40*	*10*	*2.1 mRem*	*1,2*

Notes: 1) Concentration based on maximum Ra-226 allowed to remain in soil before exceeding the State of Connecticut 19 mRem/yr TEDE standard.
2) Value selected based on initial estimated area of contamination. Refer to 5.c below for actual remediated area.

   b. Your initial activity input was 40 pCi/gm instead of the stated value of 4 pCi/gm. Describe why 40 pCi/gm was used instead of 4 pCi/gm?

      D&D modeling code was run iteratively to determine a screening value that was less than the NRC's 25 mrem/yr TEDE limit and the State of Connecticut's' 19 mrem/yr TEDE standard. The calculations resulted in 40 pCi/gm of Ra-226. The table below indicates the actual soil concentration, post remediation, and its calculated dose for Ra-226 and Ra-226+C. Area value is the actual remediated area in m^2. Refer to 5.c below.

Contaminant in soil	Concentration (pCi/gm)	Area (m2)	Calculated Annual TEDE	Notes
Ra-226	2.36	4.6	.5 mRem	
Ra-226+C	2.36	4.6	.05 mRem	

   c. You used 10 square meters for the size of the contamination. Your description states that this is only 18 square feet or about 2 square meters. Please state why you used a value of 10 square meters.

      Initial estimates of the bounded area were reported to be 10 square meters and the dose was calculated using this estimate. The actual area of remediation was 4.6 m^2. The table below indicates the dose results of the D&D Dose modeling code for 2 m^2, 4.6 m^2, 10 m^2, and unlimited area. All TEDE dose calculations are less than the NRC's 25 mrem/yr TEDE limit and the State of Connecticut's' 19

mrem/yr TEDE standard. Please note that the unlimited area concentration was based on 4.1 pci/gm of Ra-226 remaining in the soil. Post remediation soil sample results indicated one area with the highest concentration of 2.36 pCi/gm of Ra-226 remaining. The annual TEDE for this concentration is calculated to be .5 mrem TEDE using the actual remediated area of 4.6 m^2.

Contaminant in soil	*Concentration (pCi/gm)*	*Area (m2)*	*Calculated Annual TEDE*	*Notes*
Ra-226	*40*	*2*	*3.71 mRem*	
Ra-226	*40*	*4.6*	*8.53 mRem*	
Ra-226	*40*	*10*	*18.5 mRem*	
Ra-226	*4.1*	*Unlimited*	*19 mRem*	
Ra-226	*2.36*	*4.6*	*.5 mRem*	

5.9

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:35:14 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	10	CONSTANT(pCi/g)
Justification for concentration: 19 mRem TEDE. Ra-226 40 pCi/gm at 10 square meters.		Value 4.00E+01

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are** < 1.85E+01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 1.85E+01 **to** 1.86E+01 **mrem/year**

5.9

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:37:25 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra+C	10	CONSTANT(pCi/g)
Justification for concentration: Ra-226 C, 40 pCi/gm, 10 sq meters.		Value 4.00E+01

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 2.10E+00 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 2.10E+00 **to** 2.10E+00 **mrem/year**

5.b

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 3:29:18 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	4.6	CONSTANT(pCi/g)
Justification for concentration: Ra226		Value 2.36E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are** < 5.03E-01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.03E-01 **to** 5.04E-01 **mrem/year**

5.b

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 3:31:22 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra+C	4.6	CONSTANT(pCi/g)
Justification for concentration: Ra-226+C		Value 2.36E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are** < 5.69E-02 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.69E-02 **to** 5.70E-02 **mrem/year**

5.c

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:53:53 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	2	CONSTANT(pCi/g)
Justification for concentration: Initial 40 pCi/gm a 2 sq meters.		Value 4.00E+01

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are** < 3.71E+00 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 3.71E+00 **to** 3.71E+00 **mrem/year**

5.C

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:56:41 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	4.6	CONSTANT(pCi/g)
Justification for concentration: Initial 40 pCi/gm at 4.6 sq meters.		Value 4.00E+01

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 8.53E+00 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 8.53E+00 **to** 8.53E+00 **mrem/year**

5.C

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 6/26/2017 9:45:03 AM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	4.6	CONSTANT(pCi/g)
Justification for concentration: Highest post remediation results using actual remediated area.		Value 2.36E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 5.03E-01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.03E-01 **to** 5.04E-01 **mrem/year**

5. C

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 3:27:10 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	UNLIMITED	CONSTANT(pCi/g)
Justification for concentration: Radium		Value 4.10E+00

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 1.90E+01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 1.90E+01 **to** 1.90E+01 **mrem/year**

DandD Residential Scenario

DandD Version: 2.1.0
Run Date/Time: 7/27/2017 2:53:11 PM
Site Name: New England Air Museum
Description: Soil around Storage Building
FileName:S:\SHARE FILES\New England Air Museum\New England Air Museum DCGL\Soil\NEAM Soil Ra226 default.mcd

Options:

Implicit progeny doses included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON
Agricultural Pathway is OFF
Drinking Water Pathway is OFF
Irrigation Pathway is OFF
Surface Water Pathway is ON

Justification for Pathway Selection: Not Possible

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
226Ra	4.6	CONSTANT(pCi/g)
Justification for concentration: Post Remediation		Value 2.36E+00

Chain Data:

Number of chains: **1**

Chain No. 1: **226Ra**
Nuclides in chain: **5**

Nuclide	Chain Position	Half Life	First Parent	Fractional Yield	Second Parent	Fractional Yield	Ingestion CEDE	Inhalation CEDE	Surface Dose Rate	15 cm Dose Rate

							Factor (Sv/Bq)	Factor (Sv/Bq)	Factor ((Sv/d)/(Bq/m^2))	Factor ((Sv/d)/(Bq/m^3))
226Ra	1	5.84E+05					3.58E-07	2.32E-06	5.56E-13	1.42E-14
222Rn	2	3.82E+00	1	1	0	0	0.00E+00	0.00E+00	3.41E-14	9.81E-16
210Pb	3	8.15E+03	2	1	0	0	1.45E-06	3.67E-06	2.14E-13	1.13E-15
210Bi	4	5.01E+00	3	1	0	0	1.73E-09	5.29E-08	9.06E-14	1.61E-15
210Po	5	1.38E+02	4	1	0	0	5.14E-07	2.54E-06	7.16E-16	2.11E-17

Initial Concentrations:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 **quantile value**

Nuclide	Soil Concentration (pCi/g)
226Ra	1.09E-01
222Rn	0.00E+00
210Pb	0.00E+00
210Bi	0.00E+00
210Po	0.00E+00

Model Parameters:

General Parameters:

Parameter Name	Description	Distribution
Tv (1):Translocation:Leafy	Translocation factor for leafy vegetables	CONSTANT(none)
Default value used		Value 1.00E+00
Tv (2):Translocation:Root	Translocation factor for other vegetables	CONSTANT(none)
Default value used		Value 1.00E-01
Tv (3):Translocation:Fruit	Translocation factor for fruit	CONSTANT(none)
Default value used		Value 1.00E-01
Tv (4):Translocation:Grain	Translocation factor for grain	CONSTANT(none)
Default value used		Value 1.00E-01
Tf(1):Translocation:Beef Forage	Translocation factor for forage consumed by beef cattle	CONSTANT(none)
Default value used		Value 1.00E+00

Tf (2):Translocation:Poultry Forage	Translocation factor for forage consumed by poultry	CONSTANT(none)
Default value used		Value 1.00E+00
Tf(3):Translocation:Milk Cow	Translocatioin factor for forage consumed by milk cows	CONSTANT(none)
Default value used		Value 1.00E+00
Tf (4):Translocation:Layer Hen Forage	Translocation factor for forage consumed by layer hens	CONSTANT(none)
Default value used		Value 1.00E+00
Tg(1):Translocation:Beef Grain	Translocation factor for stored grain consumed by beef cattle	CONSTANT(none)
Default value used		Value 1.00E-01
Tg (2):Translocation:Poultry Grain	Translocation factor for stored grain consumed by poultry	CONSTANT(none)
Default value used		Value 1.00E-01
Tg (3):Translocation:Milk Cow Grain	Translocation factor for stored grain consumed by milk cows	CONSTANT(none)
Default value used		Value 1.00E-01
Tg (4):Translocation:Layer Hen Grain	Translocation factor for stored grain consumed by layer hens	CONSTANT(none)
Default value used		Value 1.00E-01
Th(1):Translocation:Beef Hay	Translocation factor for stored hay consumed by beef cattle	CONSTANT(none)
Default value used		Value 1.00E+00
Th (2):Translocation:Poultry Hay	Translocation factor for stored hay consumed by poultry	CONSTANT(none)
Default value used		Value 1.00E+00
Th (3):Translocation:Milk Cow Hay	Translocation factor for stored hay consumed by milk cows	CONSTANT(none)
Default value used		Value 1.00E+00
Th (4):Translocation:Layer Hen Hay	Translocation factor for stored hay consumed by layer hens	CONSTANT(none)
Default value used		Value 1.00E+00
fca(1):Beef Carbon Fraction	Mass fraction of beef cattle that is carbon	CONSTANT(none)
Default value used		Value 3.60E-01
fca(2):Poultry Carbon Fraction	Mass fraction of poultry that is carbon	CONSTANT(none)
Default value used		Value 1.80E-01
	Mass fraction of milk that is carbon	CONSTANT(none)

fca(3):Milk Carbon Fraction		
Default value used		Value 6.00E-02
fca(4):Eggs Carbon Fraction	Mass fraction of an egg that is carbon	CONSTANT(none)
Default value used		Value 1.60E-01
fcf(1):Beef Forage Carbon Fraction	Mass fraction of wet forage consumed by beef cattle that is carbon	CONSTANT(none)
Default value used		Value 1.10E-01
fcf(2):Poultry Forage Carbon Fraction	Mass fraction of wet forage consumed by poultry that is carbon	CONSTANT(none)
Default value used		Value 1.10E-01
fcf(3):Milk Cow Forage Carbon Fraction	Mass fraction of wet forage consumed by milk cows that is carbon	CONSTANT(none)
Default value used		Value 1.10E-01
fcf(4):Layer Hen Forage Carbon Fraction	Mass fraction of wet forage consumed by layer hens that is carbon	CONSTANT(none)
Default value used		Value 1.10E-01
fcg(1):Beef Grain Carbon Fraction	Mass fraction of wet stored grain consumed by beef cattle that is carbon	CONSTANT(none)
Default value used		Value 4.00E-01
fcg(2):Poultry Grain Carbon Fraction	Mass fraction of wet stored grain consumed by poultry that is carbon	CONSTANT(none)
Default value used		Value 4.00E-01
fcg(3):Milk Cow Grain Carbon Fraction	Mass fraction of wet stored grain consumed by milk cows that is carbon	CONSTANT(none)
Default value used		Value 4.00E-01
fcg(4):Layer Hen Grain Carbon Fraction	Mass fraction of wet stored grain consumed by layer hens that is carbon	CONSTANT(none)
Default value used		Value 4.00E-01
fch(1):Beef Hay Carbon Fraction	Mass fraction of wet stored hay consumed by beef cattle that is carbon	CONSTANT(none)
Default value used		Value 7.00E-02
fch(2):Poultry Hay Carbon Fraction	Mass fraction of wet stored hay consumed by poultry that is carbon	CONSTANT(none)
Default value used		Value 7.00E-02
fch(3):Milk Cow Hay Carbon Fraction	Mass fraction of wet stored hay consumed by milk cows that is carbon	CONSTANT(none)
Default value used		Value 7.00E-02
fch(4):Layer Hen Hay Carbon Fraction	Mass fraction of wet stored hay consumed by layer hens that is carbon	CONSTANT(none)
Default value used		Value 7.00E-02
	Mass fraction of dry soil that is carbon	CONSTANT(none)

fCd:Soil Carbon Fraction		
Default value used		Value 3.00E-02
SATac:Animal Product Specific Activity	Specific activity equivalence of animal product and specific activity of animal feed, forage, and soil	CONSTANT(none)
Default value used		Value 1.00E+00
xf(1):Beef Forage Contaminated Fraction	Fraction of forage consumed by beef cattle that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xf(2):Poultry Forage Contaminated Fraction	Fraction of forage consumed by poultry that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xf(3):Milk Cow Forage Contaminated Fraction	Fraction of forage consumed by milk cows that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xf(4):Layer Hen Forage Contaminated Fraction	Fraction of forage consumed by layer hens that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xg(1):Beef Grain Contaminated Fraction	Fraction of stored grain consumed by beef cattle that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xg(2):Poultry Grain Contaminated Fraction	Fraction of stored grain consumed by poultry that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xg(3):Milk Cow Grain Contaminated Fraction	Fraction of stored grain consumed by milk cows that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xg(4):Layer Hen Grain Contaminated Fraction	Fraction of stored grain that is consumed by layer hens that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xh(1):Beef Hay Contaminated Fraction	Fraction of stored hay consumed by beef cattle that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xh(2):Poultry Hay Contaminated Fraction	Fraction of stored hay consumed by poultry that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xh(3):Milk Cow Hay Contaminated Fraction	Fraction of stored hay consumed by milk cows that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xh(4):Layer Hen Hay Contaminated Fraction	Fraction of stored hay consumed by layer hens that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xw(1):Beef Water Contaminated Fraction	Fraction of water that is consumed by beef cattle that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
		CONSTANT(none)

xw(2):Poultry Water Contaminated Fraction	Fraction of water consumed by poultry that is contaminated	
Default value used		Value 1.00E+00
xw(3):Milk Cow Water Contaminated Fraction	Fraction of water consumed by milk cows that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
xw(4):Layer Hen Water Contaminated Fraction	Fraction of water consumed by layer hens that is contaminated	CONSTANT(none)
Default value used		Value 1.00E+00
DIET:Garden Diet	Fraction of human diet grown onsite	CONSTANT(none)
Default value used		Value 1.00E+00
Uv(1):Diet - Leafy	Yearly human consumption of leafy vegetables	CONSTANT(kg/y)
Default value used		Value 2.14E+01
Uv(2):Diet - Roots	Yearly human consumption of other vegetables	CONSTANT(kg/y)
Default value used		Value 4.46E+01
Uv(3):Diet - Fruit	Yearly human consumption of fruits	CONSTANT(kg/y)
Default value used		Value 5.28E+01
Uv(4):Diet - Grain	Yearly human consumption of grains	CONSTANT(kg/y)
Default value used		Value 1.44E+01
Ua(1):Diet - Beef	Yearly human consumption of beef	CONSTANT(kg/y)
Default value used		Value 3.98E+01
Ua(2):Diet - Poultry	Yearly human consumption of poultry	CONSTANT(kg/y)
Default value used		Value 2.53E+01
Ua(3):Diet - Milk	Yearly human consumption of milk	CONSTANT(L/y)
Default value used		Value 2.33E+02
Ua(4):Diet - Egg	Yearly human consumption of eggs	CONSTANT(kg/y)
Default value used		Value 1.91E+01
Uf:Diet - Fish	Yearly human consumption of fish produced from an onsite pond	CONSTANT(kg/y)
Default value used		Value 2.06E+01
tf:Consumption Period	Consumption period for fish	CONSTANT(days)
Default value used		Value 3.65E+02
tcv(1):Consumption Period - Leafy	Food consumption period for leafy vegetables	CONSTANT(days)
Default value used		Value 3.65E+02
tcv(2):Consumption Period - Roots	Food consumption period for other vegetables	CONSTANT(days)
Default value used		Value 3.65E+02
tcv(3):Consumption Period - Fruit	Food consumption period for fruits	CONSTANT(days)
Default value used		Value 3.65E+02
tcv(4):Consumption Period - Grain	Food consumption period for grains	CONSTANT(days)

Default value used		Value 3.65E+02
tca(1):Consumption Period - Beef	Food consumption period for beef	CONSTANT(days)
Default value used		Value 3.65E+02
tca(2):Consumption Period - Poultry	Food consumption period for poultry	CONSTANT(days)
Default value used		Value 3.65E+02
tca(3):Consumption Period - Milk	Food consumption period for milk	CONSTANT(days)
Default value used		Value 3.65E+02
tca(4):Consumption Period - Egg	Food consumption period for eggs	CONSTANT(days)
Default value used		Value 3.65E+02
Nunsat:Number of Unsaturated Layers	Number of model layers used to represent the unsaturated zone	CONSTANT(none)
Default value used		Value 1.00E+01
TstartR:Start Time	The start time of the scenario in days	CONSTANT(days)
Default value used		Value 0.00E+00
TendR:End Time	The ending time of the scenario in days	CONSTANT(days)
Default value used		Value 3.65E+05
dtR:Time Step Size	The time step size	CONSTANT(days)
Default value used		Value 3.65E+02
PstepR:Print Step Size	The time steps for the history file. Doses will be written to the history file every n time steps	CONSTANT(none)
Default value used		Value 1.00E+00
TI:Indoor Exposure Period	The time the resident spends indoors	CONSTANT(days/year)
Default value used		Value 2.40E+02
TX:Outdoor Exposure Period	The time the resident spends outdoors	CONSTANT(days/year)
Default value used		Value 4.02E+01
TG:Gardening Period	The time the resident spends gardening	CONSTANT(days/year)
Default value used		Value 2.92E+00
TTR:Total time in period	Total time in the one year exposure period	CONSTANT(days/year)
Default value used		Value 3.65E+02
SFI:Indoor Shielding Factor	Shielding factor for the residence	CONSTANT(none)
Default value used		Value 5.52E-01
SFO:Outdoor Shielding Factor	Shielding factor for the cover soil	CONSTANT(none)
Default value used		Value 1.00E+00
PD:Floor dust loading	Floor dust loading	UNIFORM(g/m**2)
Default value used		Lower Limit 2.00E-02 Upper Limit 3.00E-01

RFR:Indoor Resuspension Factor	Resuspension factor for indoor dust	LOGUNIFORM(1/m)
Default value used		Lower Limit 1.00E-07 Upper Limit 8.00E-05
CDO:Outdoor Dust Loading	Average dust loading outdoors	LOGUNIFORM(g/m**3)
Default value used		Lower Limit 1.00E-07 Upper Limit 1.00E-04
CDI:Indoor Dust Loading	Average dust loading indoors	DERIVED(g/m**3)
Default value used		
PF:Indoor/Outdoor Penetration Factor	Fraction of outdoor dust in indoor air	UNIFORM(none)
Default value used		Lower Limit 2.00E-01 Upper Limit 7.00E-01
CDG:Gardening Dust Loading	Average dust loading while gardening	UNIFORM(g/m**3)
Default value used		Lower Limit 1.00E-04 Upper Limit 7.00E-04
VR:Indoor Breathing Rate	Breathing rate while indoors	CONSTANT(m**3/hr)
Default value used		Value 9.00E-01
VX:Outdoor Breathing Rate	Breathing rate while outdoors	CONSTANT(m**3/hr)
Default value used		Value 1.40E+00
VG:Gardening Breathing Rate	Breathing rate while gardening	CONSTANT(m**3/hr)
Default value used		Value 1.70E+00
GR:Soil Ingestion Transfer Rate	Average rate of soil ingestion	CONSTANT(g/d)
Default value used		Value 5.00E-02
UW:Diet - Water	Drinking water ingestion rate	CONSTANT(L/d)
Default value used		Value 1.26E+00
H1:Surface Soil Thickness	Thickness of the surface soil layer	CONSTANT(m)
Default value used		Value 1.50E-01
H2:Unsaturated Zone Thickness	Thickness of the unsaturated zone	CONTINUOUS LINEAR(m)
Default value used		Value Probability 3.05E-01 0.00E+00 6.68E-01 4.76E-03 8.11E-01 9.52E-03 9.21E-01 1.43E-02 9.94E-01 1.91E-02 1.03E+00 2.38E-02 1.07E+00 2.86E-02 1.14E+00 3.33E-02 1.21E+00 3.81E-02 1.30E+00 4.29E-02 1.31E+00 4.76E-02 1.32E+00 5.24E-02

1.56E+00	5.71E-02
1.58E+00	6.19E-02
1.61E+00	6.67E-02
1.69E+00	7.62E-02
1.78E+00	8.57E-02
1.80E+00	9.05E-02
1.81E+00	9.52E-02
1.84E+00	1.00E-01
1.87E+00	1.05E-01
1.92E+00	1.10E-01
2.04E+00	1.14E-01
2.10E+00	1.19E-01
2.11E+00	1.24E-01
2.32E+00	1.29E-01
2.36E+00	1.33E-01
2.37E+00	1.38E-01
2.39E+00	1.43E-01
2.44E+00	1.48E-01
2.44E+00	1.52E-01
2.45E+00	1.57E-01
2.59E+00	1.62E-01
2.63E+00	1.67E-01
2.69E+00	1.71E-01
2.79E+00	1.76E-01
2.81E+00	1.81E-01
2.90E+00	1.86E-01
2.95E+00	1.91E-01
3.07E+00	1.95E-01
3.18E+00	2.00E-01
3.22E+00	2.05E-01
3.30E+00	2.10E-01
3.34E+00	2.14E-01
3.37E+00	2.19E-01
3.44E+00	2.24E-01
3.58E+00	2.29E-01
3.62E+00	2.33E-01
3.66E+00	2.38E-01
3.74E+00	2.43E-01
3.86E+00	2.48E-01
3.88E+00	2.52E-01
4.17E+00	2.57E-01
4.26E+00	2.62E-01
4.44E+00	2.71E-01
4.63E+00	2.76E-01
4.87E+00	2.81E-01
5.13E+00	2.86E-01
5.18E+00	2.91E-01
5.54E+00	2.95E-01
5.83E+00	3.00E-01
5.86E+00	3.05E-01
5.86E+00	3.10E-01
5.90E+00	3.14E-01
6.06E+00	3.19E-01
6.13E+00	3.24E-01
6.17E+00	3.29E-01
6.22E+00	3.33E-01
6.31E+00	3.38E-01
6.36E+00	3.43E-01
6.40E+00	3.48E-01
6.46E+00	3.52E-01
6.51E+00	3.57E-01
6.55E+00	3.62E-01

6.60E+00	3.67E-01
6.86E+00	3.71E-01
6.93E+00	3.76E-01
6.95E+00	3.86E-01
6.97E+00	3.91E-01
7.09E+00	3.95E-01
7.18E+00	4.00E-01
7.35E+00	4.05E-01
7.36E+00	4.10E-01
7.40E+00	4.14E-01
7.43E+00	4.19E-01
7.46E+00	4.24E-01
7.59E+00	4.29E-01
7.60E+00	4.33E-01
7.64E+00	4.38E-01
7.87E+00	4.43E-01
8.10E+00	4.48E-01
8.28E+00	4.52E-01
8.35E+00	4.57E-01
8.71E+00	4.62E-01
8.71E+00	4.67E-01
8.73E+00	4.71E-01
8.79E+00	4.76E-01
8.80E+00	4.81E-01
8.82E+00	4.86E-01
8.85E+00	4.91E-01
8.89E+00	4.95E-01
8.90E+00	5.00E-01
8.99E+00	5.05E-01
9.00E+00	5.10E-01
9.13E+00	5.14E-01
9.14E+00	5.19E-01
9.21E+00	5.24E-01
9.31E+00	5.29E-01
9.55E+00	5.33E-01
9.60E+00	5.38E-01
9.63E+00	5.43E-01
9.86E+00	5.48E-01
1.05E+01	5.52E-01
1.07E+01	5.57E-01
1.13E+01	5.62E-01
1.15E+01	5.67E-01
1.17E+01	5.71E-01
1.20E+01	5.76E-01
1.26E+01	5.81E-01
1.26E+01	5.86E-01
1.28E+01	5.91E-01
1.32E+01	5.95E-01
1.32E+01	6.00E-01
1.34E+01	6.05E-01
1.34E+01	6.10E-01
1.36E+01	6.14E-01
1.37E+01	6.19E-01
1.38E+01	6.24E-01
1.41E+01	6.29E-01
1.45E+01	6.33E-01
1.51E+01	6.38E-01
1.52E+01	6.43E-01
1.61E+01	6.48E-01
1.62E+01	6.52E-01
1.65E+01	6.57E-01
1.66E+01	6.62E-01

1.69E+01	6.67E-01
1.74E+01	6.71E-01
1.82E+01	6.76E-01
1.84E+01	6.81E-01
1.84E+01	6.86E-01
1.87E+01	6.91E-01
1.95E+01	6.95E-01
2.01E+01	7.00E-01
2.07E+01	7.05E-01
2.08E+01	7.10E-01
2.17E+01	7.14E-01
2.24E+01	7.19E-01
2.27E+01	7.24E-01
2.29E+01	7.29E-01
2.29E+01	7.33E-01
2.40E+01	7.38E-01
2.47E+01	7.43E-01
2.60E+01	7.48E-01
2.65E+01	7.52E-01
2.72E+01	7.57E-01
2.73E+01	7.62E-01
2.76E+01	7.67E-01
2.77E+01	7.71E-01
2.78E+01	7.76E-01
2.80E+01	7.81E-01
2.86E+01	7.86E-01
2.94E+01	7.91E-01
3.01E+01	7.95E-01
3.03E+01	8.00E-01
3.06E+01	8.10E-01
3.08E+01	8.14E-01
3.11E+01	8.19E-01
3.17E+01	8.24E-01
3.17E+01	8.29E-01
3.17E+01	8.33E-01
3.22E+01	8.38E-01
3.39E+01	8.43E-01
3.48E+01	8.48E-01
3.54E+01	8.52E-01
3.60E+01	8.57E-01
3.68E+01	8.62E-01
4.03E+01	8.67E-01
4.07E+01	8.71E-01
4.24E+01	8.76E-01
4.29E+01	8.81E-01
4.42E+01	8.86E-01
4.72E+01	8.91E-01
4.97E+01	8.95E-01
5.12E+01	9.00E-01
6.13E+01	9.05E-01
6.19E+01	9.10E-01
6.23E+01	9.14E-01
6.32E+01	9.19E-01
6.59E+01	9.24E-01
6.73E+01	9.29E-01
7.47E+01	9.33E-01
7.92E+01	9.38E-01
8.12E+01	9.43E-01
8.28E+01	9.48E-01
8.47E+01	9.52E-01
8.96E+01	9.57E-01
9.47E+01	9.62E-01

		1.08E+02 9.67E-01 1.13E+02 9.71E-01 1.15E+02 9.76E-01 1.42E+02 9.81E-01 1.77E+02 9.86E-01 1.78E+02 9.91E-01 1.80E+02 9.95E-01 3.16E+02 1.00E+00
N1:Surface Soil Porosity	Porosity of the surface soil layer	DERIVED(none)
Default value used		
N2:Unsaturated Zone Porosity	Porosity of the unsaturated zone	DERIVED(none)
Default value used		
F1:Surface Soil Saturation	Saturation ratio of the surface soil layer	DERIVED(none)
Default value used		
F2:Unsaturated Zone Saturation	Saturation ratio of the unsaturated zone	DERIVED(none)
Default value used		
INFIL:Infiltration Rate	Net rate of infiltration to aquifer	DERIVED(m/y)
Default value used		
SCSST:Soil Classification	SCS soil classification ID	DISCRETE CUMULATIVE(none)
Default value used		Value Probability 1.00E+00 1.00E-04 2.00E+00 1.34E-03 3.00E+00 1.06E-02 4.00E+00 2.51E-02 5.00E+00 6.17E-02 6.00E+00 1.09E-01 7.00E+00 1.62E-01 8.00E+00 2.12E-01 9.00E+00 2.85E-01 1.00E+01 5.10E-01 1.10E+01 7.58E-01 1.20E+01 1.00E+00
NDEV:Porosity Probability	Relative porosity value within the distribution for this soil type	UNIFORM(none)
Default value used		Lower Limit 0.00E+00 Upper Limit 1.00E+00
KSDEV:Permeability Probability	Relative permeability value within the distribution for this soil type	UNIFORM(none)
Default value used		Lower Limit 0.00E+00 Upper Limit 1.00E+00
BDEV:Parameter "b" Probability	Relative value of "b" parameter within the distribution for this soil type	UNIFORM(none)
Default value used		Lower Limit 0.00E+00 Upper Limit 1.00E+00
AP:Water Application Rate	Total water application rate on cultivated area	CONTINUOUS LINEAR(m/y)
Default value used		Value Probability 6.07E-01 0.00E+00

		6.10E-01 4.62E-01 6.35E-01 4.76E-01 7.62E-01 5.40E-01 8.89E-01 6.29E-01 1.02E+00 7.05E-01 1.14E+00 8.04E-01 1.27E+00 8.79E-01 1.40E+00 9.41E-01 1.52E+00 9.82E-01 1.65E+00 9.98E-01 1.78E+00 1.00E+00
IR:Irrigation Rate	Annual average irrigation rate	CONSTANT(L/m**2-d)
Default value used		Value 1.29E+00
RHO1:Surface Soil Density	Bulk density of soil in the surface soil layer	DERIVED(g/mL)
Default value used		
RHO2:Unsaturated Zone Density	Bulk density of soil in the unsaturated zone	DERIVED(g/mL)
Default value used		
Ksat1:Surface Soil Permeabiliy	Saturated permeability of the surface soil layer	DERIVED(cm/sec)
Default value used		
VDR:Volume of Water Consumed	Volume of water withdrawn for consumptive use	CONSTANT(L)
Default value used		Value 1.18E+05
VSW:Volume of Water in Pond	Volume of water in the pond	CONSTANT(L)
Default value used		Value 1.30E+06
AR:Cultivated Area	Area of land cultivated	DERIVED(m**2)
Default value used		
sh:Soil Moisture Content	Moisture content of soil	DERIVED(none)
Default value used		
TTG:Gardening Period	Total time in gardening period	CONSTANT(days)
Default value used		Value 9.00E+01
TD:Drinking-water consumption period	Drinking-water consumption period	CONSTANT(days)
Default value used		Value 3.65E+02
THV(1):Holdup Period : Leafy	Holdup period for leafy vegetables	CONSTANT(days)
Default value used		Value 1.00E+00
THV(2):Holdup Period : Other vegetables	Holdup period for other vegetables	CONSTANT(days)
Default value used		Value 1.40E+01
THV(3):Holdup Period : Fruits	Holdup period for fruits	CONSTANT(days)
Default value used		Value 1.40E+01
THV(4):Holdup Period : Grains	Holdup period for grains	CONSTANT(days)
Default value used		Value 1.40E+01

THA(1):Holdup Period : Beef	Holdup period for beef	CONSTANT(days)
Default value used		Value 2.00E+01
THA(2):Holdup Period : Poultry	Holdup period for poultry	CONSTANT(days)
Default value used		Value 1.00E+00
THA(3):Holdup Period : Milk	Holdup period for milk	CONSTANT(days)
Default value used		Value 1.00E+00
THA(4):Holdup Period : Eggs	Holdup period for eggs	CONSTANT(days)
Default value used		Value 1.00E+00
TGV(1):Growing Period : Leafy	Minimum growing period for leafy vegetables	CONSTANT(days)
Default value used		Value 4.50E+01
TGV(2):Growing Period : Other vegetables	Minimum growing period for other vegetables	CONSTANT(days)
Default value used		Value 9.00E+01
TGV(3):Growing Period : Fruits	Minimum growing period for fruits	CONSTANT(days)
Default value used		Value 9.00E+01
TGV(4):Growing Period : Grains	Minimum growing period for grains	CONSTANT(days)
Default value used		Value 9.00E+01
TGF(1):Growing Period : Beef Forage	Minimum growing period for forage consumed by beef cattle	CONSTANT(days)
Default value used		Value 3.00E+01
TGF(2):Growing Period : Poultry Forage	Minimum growing period for forage consumed by poultry	DERIVED(days)
Default value used		
TGF(3):Growing Period : Milk Cow Forage	Minimum growing period for forage consumed by milk cows	DERIVED(days)
Default value used		
TGF(4):Growing Period : Layer Hen Forage	Minimum growing period for forage consumed by layer hens	DERIVED(days)
Default value used		
TGG(1):Growing Period : Beef Cow Grain	Minimum growing period for stored grain consumed by beef cattle	CONSTANT(days)
Default value used		Value 9.00E+01
TGG(2):Growing Period : Poultry Grain	Minimum growing period for stored grain consumed by poultry	DERIVED(days)
Default value used		
TGG(3):Growing Period : Milk Cow Grain	Minimum growing period for stored grain consumed by milk cows	DERIVED(days)
Default value used		

TGG(4):Growing Period : Layer Hen Grain	Minimum growing period for stored grain consumed by layer hens	DERIVED(days)
Default value used		
TGH(1):Growing Period : Beef Cow Hay	Minimum growing period for stored hay consumed by beef cattle	CONSTANT(days)
Default value used		Value 4.50E+01
TGH(2):Growing Period : Poultry Hay	Minimum growing period for stored hay consumed by poultry	DERIVED(days)
Default value used		
TGH(3):Growing Period : Milk Cow Hay	Minimum growing period for stored hay consumed by milk cows	DERIVED(days)
Default value used		
TGH(4):Growing Period : Layer Hen Hay	Minimum growing period for stored hay consumed by layer hens	DERIVED(days)
Default value used		
RV(1):Interception Fraction : Leafy	Interception fraction for leafy vegetables	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RV(2):Interception Fraction : Other vegetables	Interception fraction for other vegetables	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RV(3):Interception Fraction : Fruits	Interception fraction for fruits	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RV(4):Interception Fraction : Grains	Interception fraction for grains	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RF(1):Interception Fraction : Beef Forage	Interception fraction for beef cattle forage	UNIFORM(none)
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RF(2):Interception Fraction : Poultry forage	Interception fraction for poultry forage	DERIVED(none)
Default value used		
RF(3):Interception Fraction : Milk Cow Forage	Interception fraction for milk cow forage	DERIVED(none)
Default value used		
RF(4):Interception Fraction : Layer Hen Forage	Interception fraction for layer hen forage	DERIVED(none)
Default value used		
		UNIFORM(none)

RG(1):Interception Fraction : Beef Cow Grain	Interception fraction for beef cattle grain	
Default value used		Lower Limit 1.00E-01 Upper Limit 6.00E-01
RG(2):Interception Fraction : Poultry Grain	Interception fraction for poultry grain	DERIVED(none)
Default value used		
RG(3):Interception Fraction : Milk Cow Grain	Interception fraction for milk cow grain	DERIVED(none)
Default value used		
RG(4):Interception Fraction : Layer Hen Grain	Interception fraction for layer hen grain	DERIVED(none)
Default value used		
RH(1):Interception Fraction : Beef Cow Hay	Interception fraction for beef cattle hay	DERIVED(none)
Default value used		
RH(2):Interception Fraction : Poultry Hay	Interception fraction for poultry hay	DERIVED(none)
Default value used		
RH(3):Interception Fraction : Milk Cow Hay	Interception fraction for milk cow hay	DERIVED(none)
Default value used		
RH(4):Interception Fraction : Layer Hen Hay	Interception fraction for layer hen hay	DERIVED(none)
Default value used		
YV(1):Crop Yield : Leafy	Crop yield for leafy vegetables	CONTINUOUS LINEAR(kg wet wt/m**2)

Default value used

Value	Probability
2.70E+00	0.00E+00
2.71E+00	1.60E-03
2.74E+00	6.00E-03
2.76E+00	1.76E-02
2.78E+00	4.36E-02
2.80E+00	8.48E-02
2.82E+00	1.56E-01
2.85E+00	2.57E-01
2.87E+00	3.64E-01
2.89E+00	5.00E-01
2.91E+00	6.39E-01
2.93E+00	7.46E-01
2.96E+00	8.42E-01
2.98E+00	9.09E-01
3.00E+00	9.60E-01
3.02E+00	9.84E-01
3.04E+00	9.94E-01
3.07E+00	9.97E-01
3.09E+00	9.99E-01
3.11E+00	1.00E+00
3.13E+00	1.00E+00
3.15E+00	1.00E+00

YV(2):Crop Yield : Other	Crop yield for other vegetables	CONTINUOUS LINEAR(kg wet wt/m**2)

Default value used

Value	Probability
2.26E+00	0.00E+00
2.29E+00	8.00E-04
2.30E+00	1.20E-03
2.31E+00	6.40E-03
2.33E+00	1.52E-02
2.34E+00	3.28E-02
2.35E+00	7.44E-02
2.36E+00	1.40E-01
2.38E+00	2.49E-01
2.39E+00	3.80E-01
2.40E+00	5.30E-01
2.42E+00	6.61E-01
2.43E+00	7.88E-01
2.44E+00	8.86E-01
2.45E+00	9.42E-01
2.47E+00	9.75E-01
2.48E+00	9.88E-01
2.49E+00	9.96E-01
2.51E+00	9.97E-01
2.52E+00	9.99E-01
2.53E+00	1.00E+00
2.54E+00	1.00E+00

YV(3):Crop Yield : Fruits	Crop yield for fruits	CONTINUOUS LINEAR(kg wet wt/m**2)

Default value used

Value	Probability
2.17E+00	0.00E+00
2.20E+00	1.20E-03
2.21E+00	2.40E-03
2.23E+00	6.80E-03
2.25E+00	1.80E-02
2.27E+00	4.36E-02
2.29E+00	7.64E-02
2.31E+00	1.38E-01
2.32E+00	2.14E-01
2.34E+00	3.27E-01
2.36E+00	4.50E-01
2.38E+00	5.76E-01
2.40E+00	6.87E-01
2.42E+00	7.88E-01
2.43E+00	8.68E-01
2.45E+00	9.25E-01
2.47E+00	9.60E-01
2.49E+00	9.81E-01
2.51E+00	9.92E-01
2.53E+00	9.98E-01
2.54E+00	1.00E+00
2.56E+00	1.00E+00

YV(4):Crop Yield : Grains	Crop yield for grains	CONTINUOUS LINEAR(kg wet wt/m**2)

Default value used

Value	Probability
2.85E-01	0.00E+00
2.90E-01	6.00E-04
3.02E-01	2.80E-03
3.14E-01	9.40E-03
3.26E-01	2.14E-02
3.38E-01	5.42E-02

		3.50E-01 1.08E-01 3.62E-01 2.02E-01 3.74E-01 3.15E-01 3.86E-01 4.50E-01 3.98E-01 5.92E-01 4.10E-01 7.20E-01 4.23E-01 8.26E-01 4.35E-01 9.03E-01 4.47E-01 9.51E-01 4.59E-01 9.77E-01 4.71E-01 9.91E-01 4.83E-01 9.96E-01 4.95E-01 9.99E-01 5.07E-01 1.00E+00 5.19E-01 1.00E+00 5.31E-01 1.00E+00
YF(1):Crop Yield : Beef Forage	Crop yield for beef cattle forage	BETA(kg dry wt forage/m**2)
Default value used		Lower Limit 3.70E-01 Upper Limit 5.24E-01 p 2.36E+00 q 1.40E+00
YF(2):Crop Yield : Poultry Forage	Crop yield for poultry forage	DERIVED(kg wet wt forage/m**2)
Default value used		
YF(3):Crop Yield : Milk Cow Forage	Crop yield for milk cow forage	DERIVED(kg wet wt forage/m**2)
Default value used		
YF(4):Crop Yield : Layer Hen Forage	Crop yield for layer hen forage	DERIVED(kg wet wt forage/m**2)
Default value used		
YG(1):Crop Yield : Beef Cow Grain	Crop yield for beef cattle grain	NORMAL(kg dry wt grain /m**2)
Default value used		Mean 5.78E-01 Standard Deviation 7.77E-02
YG(2):Crop Yield : Poultry Grain	Crop yield for poultry grain	DERIVED(kg wet wt grain /m**2)
Default value used		
YG(3):Crop Yield : Milk Cow Grain	Crop yield for milk cow grain	DERIVED(kg wet wt grain /m**2)
Default value used		
YG(4):Crop Yield : Layer Hen Grain	Crop yield for layer hen grain	DERIVED(kg wet wt grain /m**2)
Default value used		
YH(1):Crop Yield : Beef Cow Hay	Crop yield for beef cattle hay	DERIVED(kg wet wt/m**2)
Default value used		
YH(2):Crop Yield : Poultry Hay	Crop yield for poultry hay	DERIVED(kg wet wt/m**2)
Default value used		
YH(3):Crop Yield : Milk Cow Hay	Crop yield for milk cow hay	DERIVED(kg wet wt/m**2)

Default value used		
YH(4):Crop Yield : Layer Hen Hay	Crop yield for layer hen hay	DERIVED(kg wet wt/m**2)
Default value used		
WV(1):Wet/dry : Leafy Vegetables	Wet/dry conversion factor for leafy vegetables	CONTINUOUS LINEAR(none)

Default value used

Value	Probability
3.32E-02	0.00E+00
4.89E-02	3.45E-02
5.47E-02	6.91E-02
5.96E-02	1.04E-01
6.36E-02	1.38E-01
6.70E-02	1.73E-01
7.05E-02	2.07E-01
7.38E-02	2.42E-01
7.48E-02	2.50E-01
7.72E-02	2.76E-01
8.03E-02	3.11E-01
8.34E-02	3.45E-01
8.66E-02	3.80E-01
9.00E-02	4.15E-01
9.36E-02	4.49E-01
9.73E-02	4.84E-01
9.91E-02	4.99E-01
1.01E-01	5.18E-01
1.05E-01	5.53E-01
1.09E-01	5.87E-01
1.13E-01	6.22E-01
1.18E-01	6.56E-01
1.23E-01	6.91E-01
1.29E-01	7.25E-01
1.33E-01	7.50E-01
1.35E-01	7.60E-01
1.42E-01	7.94E-01
1.50E-01	8.29E-01
1.59E-01	8.64E-01
1.70E-01	8.98E-01
1.85E-01	9.33E-01
2.10E-01	9.67E-01
2.56E-01	9.91E-01
3.24E-01	1.00E+00

WV(2):Wet/dry : Other Vegetables	Wet/dry conversion factor for other vegetables	CONTINUOUS LINEAR(none)

Default value used

Value	Probability
3.58E-02	0.00E+00
4.87E-02	3.45E-02
5.46E-02	6.91E-02
5.90E-02	1.04E-01
6.29E-02	1.38E-01
6.69E-02	1.73E-01
7.02E-02	2.07E-01
7.34E-02	2.42E-01
7.41E-02	2.50E-01
7.65E-02	2.76E-01
7.99E-02	3.11E-01
8.32E-02	3.45E-01
8.66E-02	3.80E-01
9.05E-02	4.15E-01
9.41E-02	4.49E-01

		9.82E-02 4.84E-01
		9.98E-02 4.99E-01
		1.02E-01 5.18E-01
		1.06E-01 5.53E-01
		1.09E-01 5.87E-01
		1.14E-01 6.22E-01
		1.19E-01 6.56E-01
		1.24E-01 6.91E-01
		1.29E-01 7.25E-01
		1.33E-01 7.50E-01
		1.35E-01 7.60E-01
		1.42E-01 7.94E-01
		1.50E-01 8.29E-01
		1.59E-01 8.64E-01
		1.70E-01 8.98E-01
		1.87E-01 9.33E-01
		2.12E-01 9.67E-01
		2.62E-01 9.91E-01
		3.13E-01 1.00E+00
WV(3):Wet/dry : Fruit	Wet/dry conversion factor for fruits	CONTINUOUS LINEAR(none)
Default value used		Value Probability
		3.66E-02 0.00E+00
		4.87E-02 3.45E-02
		5.45E-02 6.91E-02
		5.93E-02 1.04E-01
		6.31E-02 1.38E-01
		6.72E-02 1.73E-01
		7.10E-02 2.07E-01
		7.44E-02 2.42E-01
		7.52E-02 2.50E-01
		7.78E-02 2.76E-01
		8.13E-02 3.11E-01
		8.45E-02 3.45E-01
		8.78E-02 3.80E-01
		9.11E-02 4.15E-01
		9.46E-02 4.49E-01
		9.82E-02 4.84E-01
		9.97E-02 4.99E-01
		1.02E-01 5.18E-01
		1.06E-01 5.53E-01
		1.10E-01 5.87E-01
		1.14E-01 6.22E-01
		1.19E-01 6.56E-01
		1.24E-01 6.91E-01
		1.29E-01 7.25E-01
		1.34E-01 7.50E-01
		1.35E-01 7.60E-01
		1.42E-01 7.94E-01
		1.49E-01 8.29E-01
		1.58E-01 8.64E-01
		1.70E-01 8.98E-01
		1.87E-01 9.33E-01
		2.14E-01 9.67E-01
		2.58E-01 9.91E-01
		3.25E-01 1.00E+00
WV(4):Wet/dry : Grain	Wet/dry conversion factor for grains	CONSTANT(none)
Default value used		Value 8.80E-01
WF(1):Wet/dry : Beef Cow Forage	Wet/dry conversion factor for beef cattle forage	BETA(none)

Default value used		Lower Limit 1.83E-01 Upper Limit 3.23E-01 p 1.15E+00 q 1.18E+00
WF(2):Wet/dry : Poultry Forage	Wet/dry conversion factor for poultry forage	DERIVED(none)
Default value used		
WF(3):Wet/dry : Milk Cow Forage	Wet/dry conversion factor for milk cow forage	DERIVED(none)
Default value used		
WF(4):Wet/dry : Layer Hen Forage	Wet/dry conversion factor for layer hen forage	DERIVED(none)
Default value used		
WG(1):Wet/dry : Beef Cow Grain	Wet/dry conversion factor for beef cattle grain	CONSTANT(none)
Default value used		Value 8.80E-01
WG(2):Wet/dry : Poultry Grain	Wet/dry conversion factor for poultry grain	DERIVED(none)
Default value used		
WG(3):Wet/dry : Milk Cow Grain	Wet/dry conversion factor for milk cow grain	DERIVED(none)
Default value used		
WG(4):Wet/dry : Layer Hen Grain	Wet/dry conversion factor for layer hen grain	DERIVED(none)
Default value used		
WH(1):Wet/dry : Beef Cow Hay	Wet/dry conversion factor for beef cattle hay	DERIVED(none)
Default value used		
WH(2):Wet/dry : Poultry Hay	Wet/dry conversion factor for poultry hay	DERIVED(none)
Default value used		
WH(3):Wet/dry : Milk Cow Hay	Wet/dry conversion factor for milk cow hay	DERIVED(none)
Default value used		
WH(4):Wet/dry : Layer Hen Hay	Wet/dry conversion factor for layer hen hay	DERIVED(none)
Default value used		
QF(1):Ingestion Rate : Beef Cow Forage	Ingestion rate for beef cattle forage	BETA(kg dry wt forage/d)
Default value used		Lower Limit 1.69E+00 Upper Limit 2.29E+00 p 1.99E+00 q 9.11E-01
QF(2):Ingestion Rate : Poultry Forage	Ingestion rate for poultry forage	BETA(kg dry wt forage/d)
Default value used		Lower Limit 3.48E-03 Upper Limit 2.82E-02 p 1.51E+00 q 1.41E+00
	Ingestion rate for milk cow forage	

QF(3):Ingestion Rate : Milk Cow Forage		CONTINUOUS LINEAR(kg dry wt forage/d)

Default value used

Value	Probability
6.35E+00	0.00E+00
6.77E+00	3.45E-02
6.96E+00	6.91E-02
7.10E+00	1.04E-01
7.24E+00	1.38E-01
7.35E+00	1.73E-01
7.47E+00	2.07E-01
7.57E+00	2.42E-01
7.60E+00	2.50E-01
7.67E+00	2.76E-01
7.77E+00	3.11E-01
7.87E+00	3.45E-01
7.98E+00	3.80E-01
8.08E+00	4.15E-01
8.18E+00	4.49E-01
8.31E+00	4.84E-01
8.37E+00	4.99E-01
8.42E+00	5.18E-01
8.54E+00	5.53E-01
8.67E+00	5.87E-01
8.81E+00	6.22E-01
8.95E+00	6.56E-01
9.10E+00	6.91E-01
9.26E+00	7.25E-01
9.38E+00	7.50E-01
9.45E+00	7.60E-01
9.68E+00	7.94E-01
9.93E+00	8.29E-01
1.02E+01	8.64E-01
1.06E+01	8.98E-01
1.11E+01	9.33E-01
1.20E+01	9.67E-01
1.33E+01	9.91E-01
1.53E+01	1.00E+00

QF(4):Ingestion Rate : Layer Hen Forage	Ingestion rate for layer hen forage	BETA(kg dry wt forage/d)

Default value used

Lower Limit	1.19E-02
Upper Limit	2.22E-02
p	1.45E+00
q	7.92E-01

QG(1):Ingestion Rate : Beef Cattle Grain	Ingestion rate for beef cattle grain	BETA(kg dry wt grain/d)

Default value used

Lower Limit	1.69E+00
Upper Limit	2.29E+00
p	1.99E+00
q	9.11E-01

QG(2):Ingestion Rate : Poultry Grain	Ingestion rate for poultry grain	BETA(kg dry wt grain/d)

Default value used

Lower Limit	1.04E-02
Upper Limit	8.45E-02
p	1.51E+00
q	1.41E+00

QG(3):Ingestion Rate : Milk Cow Grain	Ingestion rate for milk cow grain	NORMAL(kg dry wt grain/d)

Default value used		Mean 1.71E+00 Standard Deviation 2.62E-01
QG(4):Ingestion Rate : Layer Hen Grain	Ingestion rate for layer hen grain	BETA(kg dry wt grain/d)
Default value used		Lower Limit 3.58E-02 Upper Limit 6.67E-02 p 1.43E+00 q 7.92E-01
QH(1):Ingestion Rate : Beef Cattle Hay	Ingestion rate for beef cattle hay	BETA(kg dry wt hay/d)
Default value used		Lower Limit 3.38E+00 Upper Limit 4.58E+00 p 1.99E+00 q 9.11E-01
QH(2):Ingestion Rate : Poultry Hay	Ingestion rate for poultry hay	CONSTANT(kg dry wt hay/d)
Default value used		Value 0.00E+00
QH(3):Ingestion Rate : Milk Cow Hay	Ingestion rate for milk cow hay	CONTINUOUS LINEAR(kg dry wt hay/d)

Default value used

Value	Probability
5.12E+00	0.00E+00
5.43E+00	3.45E-02
5.57E+00	6.91E-02
5.68E+00	1.04E-01
5.79E+00	1.38E-01
5.89E+00	1.73E-01
5.98E+00	2.07E-01
6.06E+00	2.42E-01
6.08E+00	2.50E-01
6.14E+00	2.76E-01
6.22E+00	3.11E-01
6.30E+00	3.45E-01
6.38E+00	3.80E-01
6.46E+00	4.15E-01
6.54E+00	4.49E-01
6.63E+00	4.84E-01
6.67E+00	4.99E-01
6.72E+00	5.18E-01
6.81E+00	5.53E-01
6.92E+00	5.87E-01
7.03E+00	6.22E-01
7.13E+00	6.56E-01
7.26E+00	6.91E-01
7.39E+00	7.25E-01
7.49E+00	7.50E-01
7.56E+00	7.60E-01
7.70E+00	7.94E-01
7.89E+00	8.29E-01
8.11E+00	8.64E-01
8.39E+00	8.98E-01
8.75E+00	9.33E-01
9.44E+00	9.67E-01
1.05E+01	9.91E-01
1.27E+01	1.00E+00

QH(4):Ingestion Rate : Layer Hen Hay	Ingestion rate for layer hen hay	CONSTANT(kg dry wt hay/d)
Default value used		Value 0.00E+00

QW(1):Water Rate : Beef Cattle	Water ingestion rate for beef cattle	CONSTANT(L/d)
Default value used		Value 5.00E+01
QW(2):Water Rate : Poultry	Water ingestion rate for poultry	CONSTANT(L/d)
Default value used		Value 3.00E-01
QW(3):Water Rate : Milk Cows	Water ingestion rate for milk cows	CONSTANT(L/d)
Default value used		Value 6.00E+01
QW(4):Water Rate : Layer Hens	Water ingestion rate for layer hens	CONSTANT(L/d)
Default value used		Value 3.00E-01
QD(1):Soil Fraction : Beef Cattle	Soil intake fraction for beef cattle	CONSTANT(none)
Default value used		Value 2.00E-02
QD(2):Soil Fraction : Poultry	Soil intake fraction for poultry	CONSTANT(none)
Default value used		Value 1.00E-01
QD(3):Soil Fraction : Milk Cows	Soil intake fraction for milk cows	CONSTANT(none)
Default value used		Value 2.00E-02
QD(4):Soil Fraction : Layer Hens	Soil intake fraction for layer hens	CONSTANT(none)
Default value used		Value 1.00E-01
MLV(1):Mass-Loading : Leafy Vegetables	Mass-loading factor for leafy vegetables	CONSTANT(none)
Default value used		Value 1.00E-01
MLV(2):Mass-Loading : Other Vegetables	Mass-loading factor for other vegetables	CONSTANT(none)
Default value used		Value 1.00E-01
MLV(3):Mass-Loading : Fruits	Mass-loading factor for fruits	CONSTANT(none)
Default value used		Value 1.00E-01
MLV(4):Mass-Loading : Grains	Mass-loading factor for grains	CONSTANT(none)
Default value used		Value 1.00E-01
LAMBDW:Weathering Rate	Weathering rate for activity removal from plants	CONSTANT(1/d)
Default value used		Value 4.95E-02
MLF(1):Mass-Loading : Beef Cow Forage	Mass-loading factor for beef cattle forage	CONSTANT(none)
Default value used		Value 1.00E-01
MLF(2):Mass-Loading : Poultry Forage	Mass-loading factor for poultry forage	CONSTANT(none)
Default value used		Value 1.00E-01
MLF(3):Mass-Loading : Milk Cow Forage	Mass-loading factor for milk cow forage	CONSTANT(none)

Default value used		Value 1.00E-01
MLF(4):Mass-Loading : Layer Hen Forage	Mass-loading factor for layer hen forage	CONSTANT(none)
Default value used		Value 1.00E-01
MLG(1):Mass-Loading : Beef Cattle Grain	Mass-loading factor for beef cattle grain	CONSTANT(none)
Default value used		Value 1.00E-01
MLG(2):Mass-Loading : Poultry Grain	Mass-loading factor for poultry grain	CONSTANT(none)
Default value used		Value 1.00E-01
MLG(3):Mass-Loading : Milk Cow Grain	Mass-loading factor for milk cow grain	CONSTANT(none)
Default value used		Value 1.00E-01
MLG(4):Mass-Loading : Layer Hen Grain	Mass-loading factor for layer hen grain	CONSTANT(none)
Default value used		Value 1.00E-01
MLH(1):Mass-Loading : Beef Cattle Hay	Mass-loading factor for beef cattle hay	CONSTANT(none)
Default value used		Value 1.00E-01
MLH(2):Mass-Loading : Poultry Hay	Mass-loading factor for poultry hay	CONSTANT(none)
Default value used		Value 1.00E-01
MLH(3):Mass-Loading : Milk Cow Hay	Mass-loading factor for milk cow hay	CONSTANT(none)
Default value used		Value 1.00E-01
MLH(4):Mass-Loading : Layer Hen Hay	Mass-loading factor for layer hen hay	CONSTANT(none)
Default value used		Value 1.00E-01
TFF(1):Feeding Period : Beef Cow Forage	Feeding period for beef cattle forage	CONSTANT(days)
Default value used		Value 3.65E+02
TFF(2):Feeding Period : Poultry Forage	Feeding period for poultry forage	CONSTANT(days)
Default value used		Value 3.65E+02
TFF(3):Feeding Period : Milk Cow Forage	Feeding period for milk cow forage	CONSTANT(days)
Default value used		Value 3.65E+02
TFF(4):Feeding Period : Layer Hen Forage	Feeding period for layer hen forage	CONSTANT(days)
Default value used		Value 3.65E+02
TFG(1):Feeding Period : Beef Cattle Grain	Feeding period for beef cattle grain	CONSTANT(days)
Default value used		Value 3.65E+02
TFG(2):Feeding Period : Poultry Grain	Feeding period for poultry grain	CONSTANT(days)
Default value used		Value 3.65E+02
	Feeding period for milk cow grain	CONSTANT(days)

TFG(3):Feeding Period : Milk Cow Grain		
Default value used		Value 3.65E+02
TFG(4):Feeding Period : Layer Hen Grain	Feeding period for layer hen grain	CONSTANT(days)
Default value used		Value 3.65E+02
TFH(1):Feeding Period : Beef Cattle Hay	Feeding period for beef cattle hay	CONSTANT(days)
Default value used		Value 3.65E+02
TFH(2):Feeding Period : Poultry Hay	Feeding period for poultry hay	CONSTANT(days)
Default value used		Value 3.65E+02
TFH(3):Feeding Period : Milk Cow Hay	Feeding period for milk cow hay	CONSTANT(days)
Default value used		Value 3.65E+02
TFH(4):Feeding Period : Layer Hen Hay	Feeding period for layer hen hay	CONSTANT(days)
Default value used		Value 3.65E+02
TFW(1):Water Period : Beef Cattle	Water ingestion period for beef cattle	CONSTANT(days)
Default value used		Value 3.65E+02
TFW(2):Water Period : Poultry	Water ingestion period for poultry	CONSTANT(days)
Default value used		Value 3.65E+02
TFW(3):Water Period : Milk Cows	Water ingestion period for milk cows	CONSTANT(days)
Default value used		Value 3.65E+02
TFW(4):Water Period : Layer Hens	Water ingestion period for layer hens	CONSTANT(days)
Default value used		Value 3.65E+02
fha(1):Hydrogen Fraction : Beef Cattle	Hydrogen fraction for beef cattle	CONSTANT(none)
Default value used		Value 1.00E-01
fha(2):Hydrogen Fraction : Poultry	Hydrogen fraction for poultry	CONSTANT(none)
Default value used		Value 1.00E-01
fha(3):Hydrogen Fraction : Milk Cows	Hydrogen fraction for milk cows	CONSTANT(none)
Default value used		Value 1.10E-01
fha(4):Hydrogen Fraction : Eggs	Hydrogen fraction for eggs	CONSTANT(none)
Default value used		Value 1.10E-01
fhv(1):Hydrogen Fraction : Leafy Vegetables	Hydrogen fraction for leafy vegetables	CONSTANT(none)
Default value used		Value 1.00E-01
	Hydrogen fraction for other vegetables	CONSTANT(none)

fhv(2):Hydrogen Fraction : Other Vegetables		
Default value used		Value 1.00E-01
fhv(3):Hydrogen Fraction : Fruits	Hydrogen fraction for fruits	CONSTANT(none)
Default value used		Value 1.00E-01
fhv(4):Hydrogen Fraction : Grains	Hydrogen fraction for grains	CONSTANT(none)
Default value used		Value 6.80E-02
fhf(1):Hydrogen Fraction : Beef Cow Forage	Hydrogen fraction for beef cattle forage	CONSTANT(none)
Default value used		Value 1.00E-01
fhf(2):Hydrogen Fraction : Poultry Forage	Hydrogen fraction for poultry forage	CONSTANT(none)
Default value used		Value 1.00E-01
fhf(3):Hydrogen Fraction : Milk Cow Forage	Hydrogen fraction for milk cow forage	CONSTANT(none)
Default value used		Value 1.00E-01
fhf(4):Hydrogen Fraction : Layer Hen Forage	Hydrogen fraction for layer hen forage	CONSTANT(none)
Default value used		Value 1.00E-01
fhh(1):Hydrogen Fraction : Beef Cattle Hay	Hydrogen fraction for beef cattle hay	CONSTANT(none)
Default value used		Value 1.00E-01
fhh(2):Hydrogen Fraction : Poultry Hay	Hydrogen fraction for poultry hay	CONSTANT(none)
Default value used		Value 1.00E-01
fhh(3):Hydrogen Fraction : Milk Cow Hay	Hydrogen fraction for milk cow hay	CONSTANT(none)
Default value used		Value 1.00E-01
fhh(4):Hydrogen Fraction : Layer Hen Hay	Hydrogen fraction for layer hen hay	CONSTANT(none)
Default value used		Value 1.00E-01
fhg(1):Hydrogen Fraction : Beef Cattle Grain	Hydrogen fraction for beef cattle grain	CONSTANT(none)
Default value used		Value 6.80E-02
fhg(2):Hydrogen Fraction : Poultry Grain	Hydrogen fraction for poultry grain	CONSTANT(none)
Default value used		Value 6.80E-02
	Hydrogen fraction for milk cow grain	CONSTANT(none)

fhg(3):Hydrogen Fraction : Milk Cow Grain		
Default value used		Value 6.80E-02
fhg(4):Hydrogen Fraction : Layer Hen Grain	Hydrogen fraction for layer hen grain	CONSTANT(none)
Default value used		Value 6.80E-02
fhd016:Hydrogen Fraction : Soil	Fraction of hydrogen in soil	DERIVED(none)
Default value used		
sasvh:Tritium Equivalence: Plant/Soil	Tritium equivalence: plant/soil	CONSTANT(none)
Default value used		Value 1.00E+00
sawvh:Tritium Equivalence: Plant/Water	Tritium equivalence: plant/water	CONSTANT(none)
Default value used		Value 1.00E+00
satah:Tritium Equivalence: Animal Products	Tritium equivalence: animal product intake	CONSTANT(none)
Default value used		Value 1.00E+00
YA(1):Animal Product Yield : Beef Cattle	Annual yield of beef per individual animal	CONSTANT(kg/y)
Default value used		Value 2.09E+02
YA(2):Animal Product Yield : Poultry	Annual yield of chicken per individual animal	CONSTANT(kg/y)
Default value used		Value 1.53E+00
YA(3):Animal Product Yield : Milk Cows	Annual yield of milk per individual animal	CONSTANT(L/y)
Default value used		Value 7.41E+03
YA(4):Animal Product Yield : Layer Hens	Annual yield of eggs per individual animal	CONSTANT(kg/y)
Default value used		Value 1.26E+01
AREXt:External Exposure Area	Minimum surface area to which resident is exposed via external radiation during residential period	CONSTANT(m**2)
Default value used		Value 1.00E+02
ARInh:Inhalation Exposure Area	Minimum surface area to which resident is exposed via inhalation during residential period	CONSTANT(m**2)
Default value used		Value 1.00E+02
ARIng:Secondary Ingestion Exposure Area	Minimum surface area to which resident is exposed via secondary ingestion during residential period	CONSTANT(m**2)
Default value used		Value 1.00E+02
ARAgr:Agricultural Exposure Area	Minimum surface area to which resident is exposed via any agricultural product during residential period	DERIVED(m**2)

Default value used		
ARH2O:Groundwater Exposure Area	Minimum surface area to which resident is exposed via groundwater during residential period	DERIVED(m**2)
Default value used		
ARAll:Exposure Area	Minimum surface area to which resident is exposed via any pathway during the residential period	DERIVED(m**2)
Default value used		

Element Dependant Parameters

Parameter Name	Description	Distribution
Pb:Coefficient	Partition coefficient for Pb	NORMAL(Log10(mL/g))
Default value used		Mean 3.38E+00 Standard Deviation 1.20E+00
Bi:Coefficient	Partition coefficient for Bi	NORMAL(Log10(mL/g))
Default value used		Mean 2.65E+00 Standard Deviation 1.40E+00
Po:Coefficient	Partition coefficient for Po	NORMAL(Log10(mL/g))
Default value used		Mean 2.26E+00 Standard Deviation 7.30E-01
Rn:Coefficient	Partition coefficient for Rn	CONSTANT(mL/g)
Default value used		Value 0.00E+00
Ra:Coefficient	Partition coefficient for Ra	NORMAL(Log10(mL/g))
Default value used		Mean 3.55E+00 Standard Deviation 7.40E-01
Pb:Leafy	Leafy plant concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Mean of Ln(X) -3.10E+00 Standard Deviation of Ln 9.04E-01
Bi:Leafy	Leafy plant concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Mean of Ln(X) -3.35E+00 Standard Deviation of Ln 9.04E-01
Po:Leafy	Leafy plant concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Mean of Ln(X) -5.99E+00 Standard Deviation of Ln 9.04E-01
Rn:Leafy	Leafy plant concentration factor for Rn	CONSTANT(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Value 0.00E+00
Ra:Leafy	Leafy plant concentration factor for Ra	LOGNORMAL-N(pCi/kg dry-wt leafy per pCi/kg soil)
Default value used		Mean of Ln(X) -4.20E+00 Standard Deviation of Ln 9.04E-01

Pb:Root	Root plant concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Mean of Ln(X) -4.71E+00 Standard Deviation of Ln 9.04E-01
Bi:Root	Root plant concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Mean of Ln(X) -5.30E+00 Standard Deviation of Ln 9.04E-01
Po:Root	Root plant concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Mean of Ln(X) -7.82E+00 Standard Deviation of Ln 9.04E-01
Rn:Root	Root plant concentration factor for Rn	CONSTANT(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Value 0.00E+00
Ra:Root	Root plant concentration factor for Ra	LOGNORMAL-N(pCi/kg dry-wt roots per pCi/kg soil)
Default value used		Mean of Ln(X) -6.50E+00 Standard Deviation of Ln 9.04E-01
Pb:Fruit	Fruit concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Mean of Ln(X) -4.71E+00 Standard Deviation of Ln 9.04E-01
Bi:Fruit	Fruit concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Mean of Ln(X) -5.30E+00 Standard Deviation of Ln 9.04E-01
Po:Fruit	Fruit concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Mean of Ln(X) -7.82E+00 Standard Deviation of Ln 9.04E-01
Rn:Fruit	Fruit concentration factor for Rn	CONSTANT(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Value 0.00E+00
Ra:Fruit	Fruit concentration factor for Ra	LOGNORMAL-N(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		Mean of Ln(X) -6.50E+00 Standard Deviation of Ln 9.04E-01
Pb:Grain	Grain concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Mean of Ln(X) -4.71E+00 Standard Deviation of Ln 9.04E-01
Bi:Grain	Grain concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Mean of Ln(X) -5.30E+00 Standard Deviation of Ln 9.04E-01
Po:Grain	Grain concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Mean of Ln(X) -7.82E+00 Standard Deviation of Ln 9.04E-01
Rn:Grain	Grain concentration factor for Rn	CONSTANT(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Value 0.00E+00
Ra:Grain	Grain concentration factor for Ra	

		LOGNORMAL-N(pCi/kg dry-wt grain per pCi/kg soil)
Default value used		Mean of Ln(X) -6.50E+00 Standard Deviation of Ln 9.04E-01
Pb:Beef	Beef transfer factor for Pb	CONSTANT(d/kg)
Default value used		Value 3.00E-04
Bi:Beef	Beef transfer factor for Bi	CONSTANT(d/kg)
Default value used		Value 4.00E-04
Po:Beef	Beef transfer factor for Po	CONSTANT(d/kg)
Default value used		Value 3.00E-04
Rn:Beef	Beef transfer factor for Rn	CONSTANT(d/kg)
Default value used		Value 0.00E+00
Ra:Beef	Beef transfer factor for Ra	CONSTANT(d/kg)
Default value used		Value 2.50E-04
Pb:Poultry	Poultry transfer factor for Pb	CONSTANT(d/kg)
Default value used		Value 2.00E-01
Bi:Poultry	Poultry transfer factor for Bi	CONSTANT(d/kg)
Default value used		Value 1.00E-01
Po:Poultry	Poultry transfer factor for Po	CONSTANT(d/kg)
Default value used		Value 9.00E-01
Rn:Poultry	Poultry transfer factor for Rn	CONSTANT(d/kg)
Default value used		Value 0.00E+00
Ra:Poultry	Poultry transfer factor for Ra	CONSTANT(d/kg)
Default value used		Value 3.00E-02
Pb:Milk	Milk transfer factor for Pb	CONSTANT(d/L)
Default value used		Value 2.50E-04
Bi:Milk	Milk transfer factor for Bi	CONSTANT(d/L)
Default value used		Value 5.00E-04
Po:Milk	Milk transfer factor for Po	CONSTANT(d/L)
Default value used		Value 3.50E-04
Rn:Milk	Milk transfer factor for Rn	CONSTANT(d/L)
Default value used		Value 0.00E+00
Ra:Milk	Milk transfer factor for Ra	CONSTANT(d/L)
Default value used		Value 4.50E-04
Pb:Eggs	Egg transfer factor for Pb	CONSTANT(d/kg)
Default value used		Value 8.00E-01
Bi:Eggs	Egg transfer factor for Bi	CONSTANT(d/kg)
Default value used		Value 8.00E-01
Po:Eggs	Egg transfer factor for Po	CONSTANT(d/kg)
Default value used		Value 7.00E+00
Rn:Eggs	Egg transfer factor for Rn	CONSTANT(d/kg)
Default value used		Value 0.00E+00
Ra:Eggs	Egg transfer factor for Ra	CONSTANT(d/kg)
Default value used		Value 2.00E-05
Pb:Factor	Bioaccumulation factor for Pb in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)

Default value used		Value 1.00E+02
Bi:Factor	Bioaccumulation factor for Bi in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)
Default value used		Value 1.50E+01
Po:Factor	Bioaccumulation factor for Po in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)
Default value used		Value 5.00E+02
Rn:Factor	Bioaccumulation factor for Rn in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)
Default value used		Value 0.00E+00
Ra:Factor	Bioaccumulation factor for Ra in fish	CONSTANT(pCi/kg wet-wt fish per pCi/L water)
Default value used		Value 7.00E+01

Correlation Coefficients:

Parameter One	Parameter Two	Correlation Coefficient
KSDEV:Permeability Probability	**BDEV:Parameter "b" Probability**	-0.35
Default value used		
NDEV:Porosity Probability	**BDEV:Parameter "b" Probability**	-0.35
Default value used		

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 5.03E-01 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 5.03E-01 **to** 5.04E-01 **mrem/year**

Detailed Results:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 **quantile value**

Concentration at Time of Peak Dose:

Nuclide	Soil Concentration (pCi/g)	Water Concentration (pCi/g)
226Ra	1.08E-01	1.48E-17
222Rn	1.07E-01	1.83E-09
210Pb	3.99E-02	1.20E-07
210Bi	3.99E-02	1.88E-07
210Po	3.87E-02	9.80E-08

Pathway Dose from All Nuclides (mrem)

		External	Inhalation	

All Pathways Dose	Surface Water			Secondary Ingestion
5.04E-01	1.61E-06	4.99E-01	5.52E-04	6.21E-03

Radionuclide Dose through All Active Pathways (mrem)

Nuclide	All Pathways Dose
226Ra	3.98E-03
222Rn	4.98E-01
210Pb	3.65E-03
210Bi	8.28E-05
210Po	1.31E-03
All Nuclides	5.04E-01

Dose from Each Nuclide through Each Active Pathway (mrem)

Nuclide	Surface Water	External	Inhalation	Secondary Ingestion
226Ra	1.38E-17	1.63E-03	3.02E-04	2.03E-03
222Rn	0.00E+00	4.98E-01	5.07E-07	1.39E-06
210Pb	6.58E-07	4.88E-05	1.50E-04	3.11E-03
210Bi	1.85E-10	6.95E-05	2.16E-06	3.71E-06
210Po	9.53E-07	8.86E-07	1.00E-04	1.07E-03

5. On Page 156, you provide your DandD calculation for the radioactivity in the soil at the gauge building. Please provide some additional justification for the following inputs of the calculation:

   a. You used Ra-226 instead of Ra-226 + C. Please describe why the daughters of Ra-226 were not considered in the calculation for the initial dose as it appears the contamination occurred over a number of years.

      Using the D&D modeling code, Ra-226 was a more conservative selection in our dose calculation versus Ra-226+C. The lower Annual TEDE of the Ra-226+C is the result of the 1st decay product of the Ra-226 decay chain is Rn-222, a gas, and would have dissipated into the atmosphere resulting in a significant reduction in dose since contamination was located in an outside environment. D&D modeling code results are enclosed to support the comparisons. Please see the table below.

Contaminant in soil	*Concentration (pCi/gm)*	*Area (m2)*	*Calculated Annual TEDE*	*Notes*
Ra-226	*40*	*10*	*18.5 mRem*	*1,2*
Ra-226 C	*40*	*10*	*2.1 mRem*	*1,2*

Notes: 1) Concentration based on maximum Ra-226 allowed to remain in soil before exceeding the State of Connecticut 19 mRem/yr TEDE standard.
2) Value selected based on initial estimated area of contamination. Refer to 5.c below for actual remediated area.

   b. Your initial activity input was 40 pCi/gm instead of the stated value of 4 pCi/gm. Describe why 40 pCi/gm was used instead of 4 pCi/gm?

      D&D modeling code was run iteratively to determine a screening value that was less than the NRC's 25 mrem/yr TEDE limit and the State of Connecticut's' 19 mrem/yr TEDE standard. The calculations resulted in 40 pCi/gm of Ra-226. The table below indicates the actual soil concentration, post remediation, and its calculated dose for Ra-226 and Ra-226+C. Area value is the actual remediated area in m^2. Refer to 5.c below.

Contaminant in soil	Concentration (pCi/gm)	Area (m2)	Calculated Annual TEDE	Notes
Ra-226	2.36	4.6	.5 mRem	
Ra-226+C	2.36	4.6	.05 mRem	

   c. You used 10 square meters for the size of the contamination. Your description states that this is only 18 square feet or about 2 square meters. Please state why you used a value of 10 square meters.

      Initial estimates of the bounded area were reported to be 10 square meters and the dose was calculated using this estimate. The actual area of remediation was 4.6 m^2. The table below indicates the dose results of the D&D Dose modeling code for 2 m^2, 4.6 m^2, 10 m^2, and unlimited area. All TEDE dose calculations are less than the NRC's 25 mrem/yr TEDE limit and the State of Connecticut's' 19

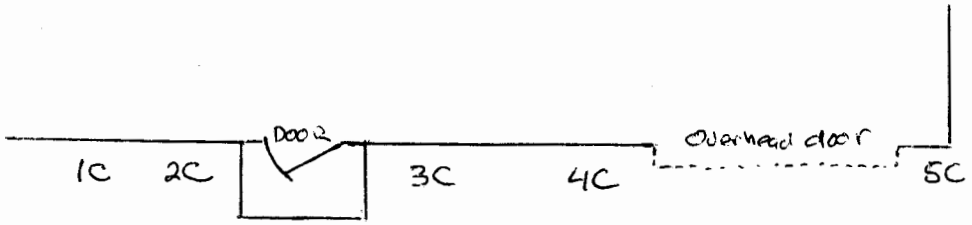
mrem/yr TEDE standard. Please note that the unlimited area concentration was based on 4.1 pci/gm of Ra-226 remaining in the soil. Post remediation soil sample results indicated one area with the highest concentration of 2.36 pCi/gm of Ra-226 remaining. The annual TEDE for this concentration is calculated to be .5 mrem TEDE using the actual remediated area of 4.6 m^2.

Contaminant in soil	*Concentration (pCi/gm)*	*Area (m2)*	*Calculated Annual TEDE*	*Notes*
Ra-226	*40*	*2*	*3.71 mRem*	
Ra-226	*40*	*4.6*	*8.53 mRem*	
Ra-226	*40*	*10*	*18.5 mRem*	
Ra-226	*4.1*	*Unlimited*	*19 mRem*	
Ra-226	*2.36*	*4.6*	*.5 mRem*	

RADIOLOGICAL SURVEY FORM

Location: NFAM Warehouse | Purpose: Post Remediation Soil Samples

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



Comments:	Instrumentation	Key O=Smear Location, Dose Rate = (uR/hr, mr/hr), "X"= Fixed (CCPM/DPM)α/β			
Composite Samples from each location	Make:	Model	Serial #	Cal Due	QA Check
	Make:	Model:	Serial #	Cal Due	QA Check
	Make:	Model	Serial #	Cal Due	QA Check
		Performed By [illegible]		Date: 7/2/15	
Background (s) ND ≤ Background		Reviewed By		Date	

Post Remediation Soil Sample Results

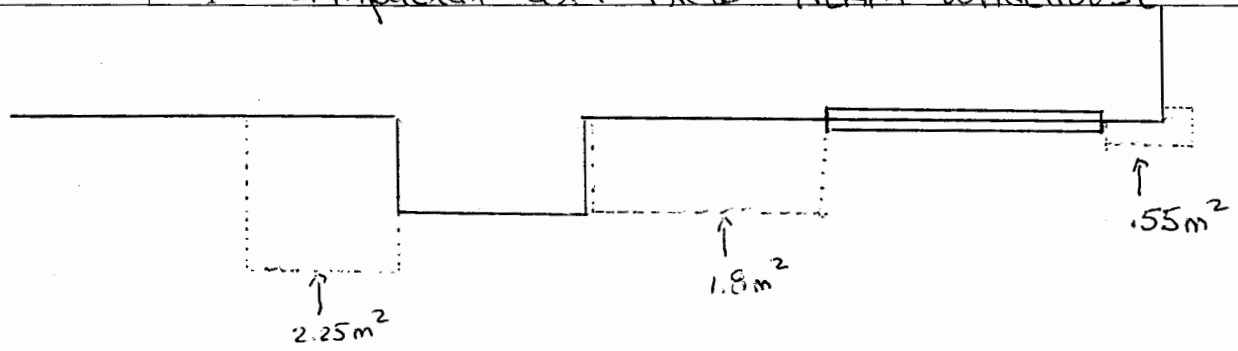
Sample #	Reported Value (pCi/gm)	Background (pCi/gm)	Net Value(pCi/gm)
1C	1.42	1.0	.42
2C	2.35	1.0	1.35
3C	3.36	1.0	2.36
4C	1.23	1.0	.23
5C	1.53	1.0	.53

Highest reported value: 2.36 pCi/gm

RADIOLOGICAL SURVEY FORM

Location: NEAM WAREHOUSE | Purpose: Impacted Soil Area NEAM WAREHOUSE

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



Total Area 4.6 m²

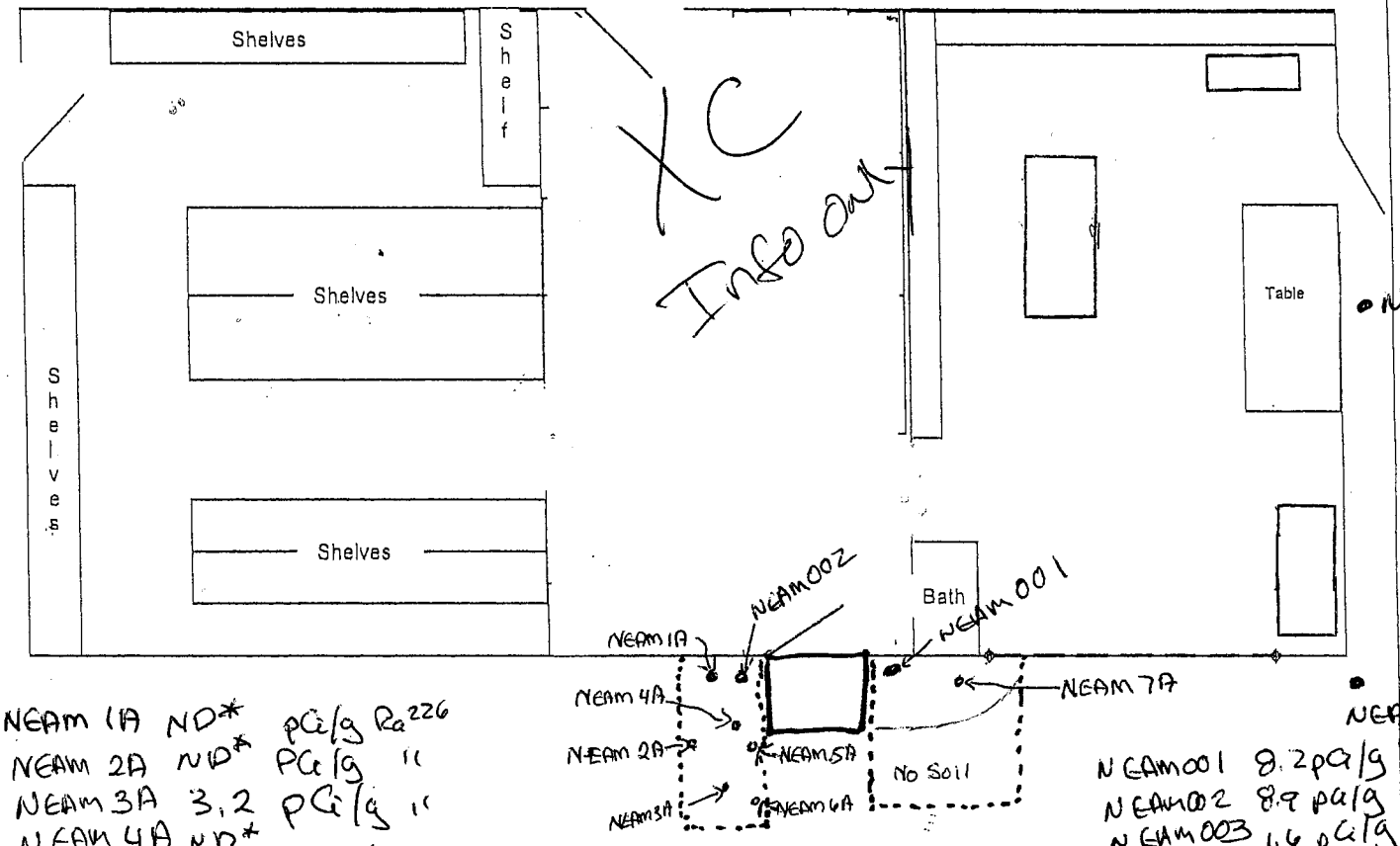
Comments:	Instrumentation	Key O=Smear Location, Dose Rate = (uR/hr, mr/hr), "X"= Fixed (CCPM/DPM)α/β			
	Make:	Model	Serial #	Cal Due	QA Check
	Make: NA	Model:	Serial #	Cal Due	QA Check
	Make:	Model	Serial #	Cal Due	QA Check
		Performed By RB Ciavik		Date: 7/23/15	
Background (s) ND ≤ Background		Reviewed By M. Frank		Date 8/5/15	

RADIOLOGICAL SURVEY FORM

Location: NEAM Storage Building

Purpose: ~~Monthly Survey~~ Soil Sampling

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



XC
Info on

NEAM 1A ND* pCi/g Ra^{226}
NEAM 2A ND* pCi/g "
NEAM 3A 3.2 pCi/g "
NEAM 4A ND* "
NEAM 5A 0.8 pCi/g "
NEAM 6A 0.8 pCi/g "
NEAM 7A 5.72 pCi/g "

NEAM001 8.2pCi/g
NEAM002 8.9 pCi/g
NEAM003 1.6 pCi/g
NEAM004 1.2 pCi/g

ND - Not Identified MDA <1.2 pCi/g

Comments:	Instrumentation	Key O=Smear Location, Dose Rate = (uRem/hr), "X"= Fixed (CCPM/DPM)α/β			
---- Area posted RAM	Make:	Model:	Serial #:	Cal Due:	QA Check:
	Make:	Model:	Serial #:	Cal Due:	QA Check:
See Attached results	Make:	Model:	Serial #:	Cal Due:	QA Check:
		Performed By RClark/G McCahill			Date: 9/26/14
Background (s) ND ≤ Background = α β		Reviewed By			Date:

CHAIN OF CUSTODY

Department of Energy & Environmental Protection
Bureau of Air Management
Division of Radiation
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3029

Page 1 of 1

Project Name: NEAM DEEP Project					Sample Type				Container	Remarks
Samplers Signature: [signature]					Composite		Grab			
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid		
	7/2/15	1310	NEAM 1C			X			500 ML mason jar	DRY Soil
	7/2/15	1325	NEAM 2C			X				
	7/2/15	1340	NEAM 3C			X				
	7/2/15	1355	NEAM 4C			X				
	7/2/15	1440	NEAM 5C			X				

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
RB Clerk	8/13/15	11:00	DEEP Shipping under Seal				
Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:

August 13, 2015

Attn: Sample Receiving

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830-7371

Please perform Gamma Spectroscopy analysis for the enclosed soil samples, isotope of interest is Ra-226

These samples are being shipped in 1 cardboard box. Standard turnaround is requested for these samples. When sample analysis is complete please mail a PDF CD of the final report to Mike Firsick at the address listed below. If you have any questions, please feel free to call me at 1-860-424-3534.

Please mail the results to the following address.

Attn: Mike Firsick
Division of Radiation
Department of Energy & Environmental Protection
79 Elm Street
Hartford, CT 06106

Thank you.

Bob Clark

CHAIN OF CUSTODY

15-08076

Department of Energy & Environmental Protection
Bureau of Air Management
Division of Radiation
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3029

REC'D AUG 18 2015

Page 1 of 1

Project Name: NEAM DEEP Project					Sample Type				Container	Remarks
Samplers Signature: RBClark					Composite		Grab			
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid		
4	7/2/15	1310	NEAM 1C			X			500 ML manual	Dry Soil
5	7/2/15	1325	NEAM 2C			X			↓	↓
6	7/2/15	1340	NEAM 3C			X				
7	7/2/15	1355	NEAM 4C			X				
8	7/2/15	1440	NEAM 5C			X				

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
RB Clark	8/13/15	11:00	DEEP Shipping under seal	UPS	8/18/15	1400	Kristen Carlson
Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
Ct Dept of Energy & Env Protection	DEPM1-0000039273	Environmental	08/18/2015	30	15-08076
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
DEPM1-0000039273	NEAM DEEP Project	H	09/10/2015	09/16/2015	09/17/2015

Internal ID	Client ID	Sample Date	Matrix	Storage	Gamma																								Ttl
01	LCS	08/18/15	SO	G1.0	X																								1
02	BLANK	08/18/15	SO	G1.0	X																								1
03	DUP	08/18/15	SO	G1.0	X																								1
04	NEAM 1C	07/02/15 13:10	SO	G1.0	X																								1
05	NEAM 2C	07/02/15 13:25	SO	G1.0	X																								1
06	NEAM 3C	07/02/15 13:40	SO	G1.0	X																								1
07	NEAM 4C	07/02/15 13:55	SO	G1.0	X																								1
08	NEAM 5C	07/02/15 14:40	SO	G1.0	X																								1
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
	Totals Per Analysis (non QA samples)				5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

Sample Log In Report

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830

Voice: (865) 481-0683
Fax: (865) 483-4621

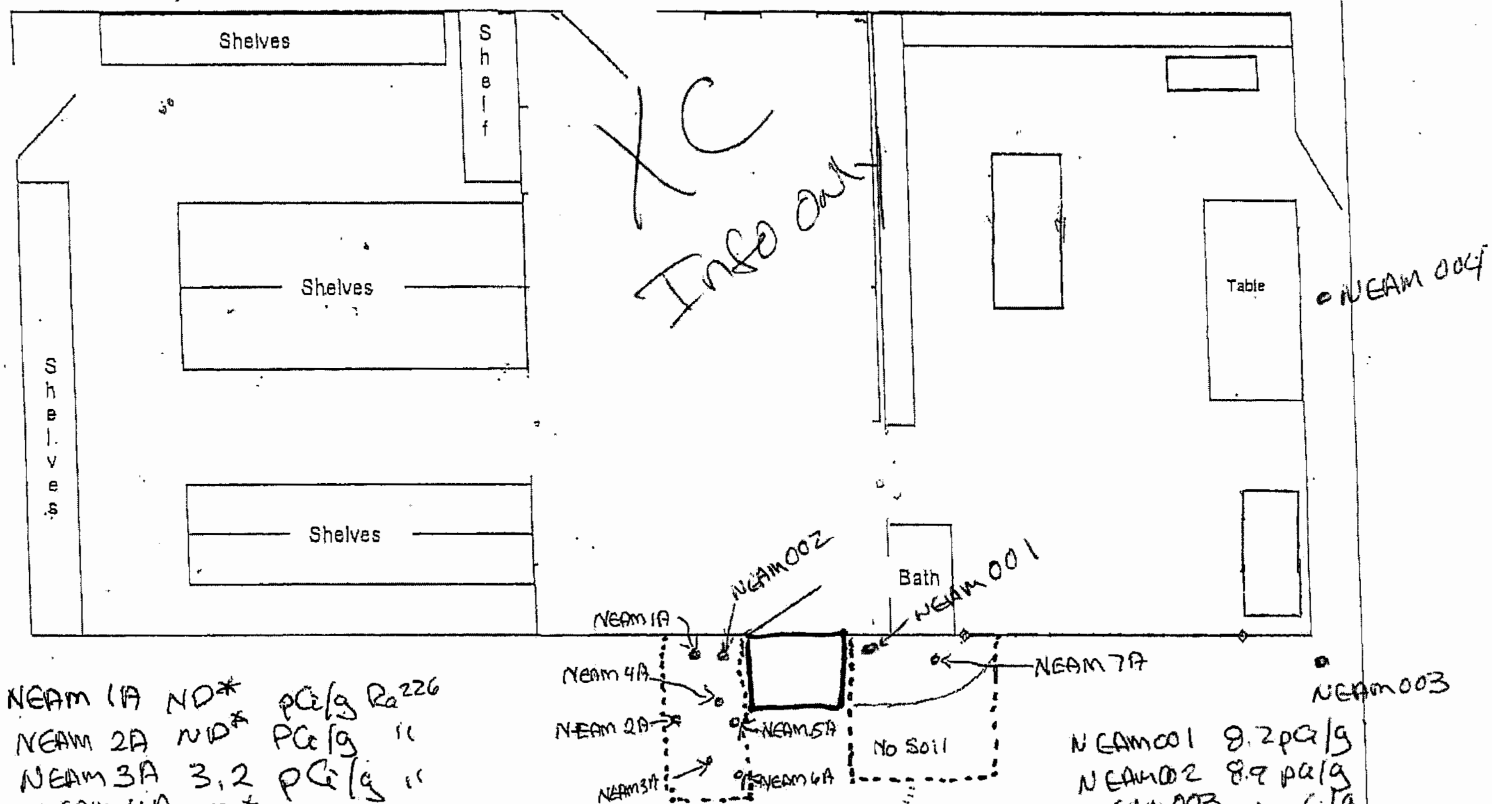
Invoice		Report Data	
	Accounts Payable		Michael Firsick
	Ct DEEP Division of Radiation		Ct DEEP Div of Radiation
	79 Elm Street		79 Elm Street
	Hartford, Ct 06106		Hartford, CT 06106
Voice	860-424-3517	Voice	860-424-3517
Fax	860-424-4065	Fax	860-424-4065
Contact	Michael Firsick		
Voice	860-424-3517		
Fax	860-424-4065		

Printed: 8/18/201[illegible] [illegible]6 PM

RADIOLOGICAL SURVEY FORM

Location: NEAM Storage Building | Purpose: ~~Monthly Survey~~ Soil Sampling

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



NEAM 1A ND* pCi/g Ra226
NEAM 2A ND* pCi/g "
NEAM 3A 3.2 pCi/g "
NEAM 4A ND*
NEAM 5A 0.8 pCi/g "
NEAM 6A 0.8 pCi/g "
NEAM 7A 5.72 pCi/g "

NEAM001 8.2 pCi/g
NEAM002 8.9 pCi/g
NEAM003 1.4 pCi/g
NEAM004 1.2 pCi/g

ND - Not Identified MDA <1.2 pCi/g

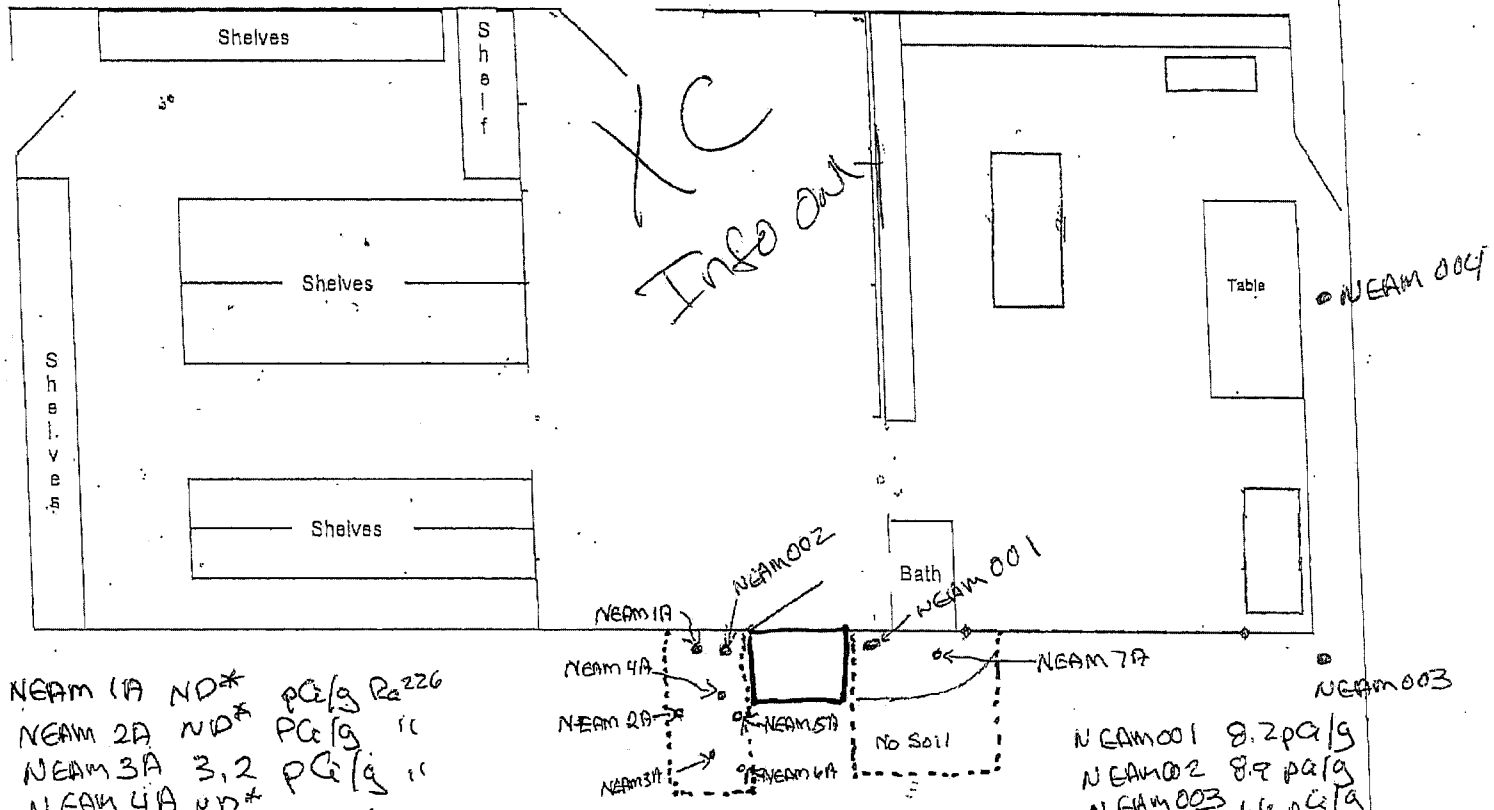
Comments:	Instrumentation	Key O=Smear Location, Dose Rate = (uRem/hr), "X"= Fixed (CCPM/DPM)α/β			
---- Area posted RAM	Make:	Model:	Serial #:	Cal Due:	QA Check:
	Make:	Model:	Serial #:	Cal Due:	QA Check:
See Attached results	Make:	Model:	Serial #:	Cal Due:	QA Check:
		Performed By R Clark / G McCahill		Date: 9/26/14	
Background (s) ND ≤ Background = α β		Reviewed By		Date:	

RADIOLOGICAL SURVEY FORM

Location: NEAM Storage Building

Purpose: ~~Monthly Survey~~ Soil Sampling

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



XC
Info on

NEAM 1A ND* pCi/g Ra^{226}
NEAM 2A ND* pCi/g "
NEAM 3A 3.2 pCi/g "
NEAM 4A ND* pCi/g "
NEAM 5A 0.8 pCi/g "
NEAM 6A 0.8 pCi/g "
NEAM 7A 5.72 pCi/g "

NEAM001 8.2pCi/g
NEAM002 8.9 pCi/g
NEAM003 1.6 pCi/g
NEAM004 1.2 pCi/g

ND - Not Identified MDA < 1.2 pCi/g

Comments:	Instrumentation	Key O=Smear Location, Dose Rate = (uRem/hr), "X"= Fixed (CCPM/DPM)α/β			
---- Area posted RAM	Make:	Model:	Serial #:	Cal Due:	QA Check:
	Make:	Model:	Serial #:	Cal Due:	QA Check:
See Attached results	Make:	Model:	Serial #:	Cal Due:	QA Check:
		Performed By RClark/G McCahill		Date: 9/26/14	
Background (s) ND ≤ Background = α β		Reviewed By		Date:	

CHAIN OF CUSTODY

Department of Energy & Environmental Protection
Bureau of Air Management
Division of Radiation
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3029

Page 1 of 1

Project Name: NEAM DEEP Project					Sample Type				Container	Remarks
Samplers Signature: RBClark					Composite		Grab			
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid		
	7/2/15	1310	NEAM 1C			X			500 ML Manual	DRY Soil
	7/2/15	1325	NEAM 2C			X			↓	↓
	7/2/15	1340	NEAM 3C			X				
	7/2/15	1355	NEAM 4C			X				
	7/2/15	1440	NEAM 5C			X				

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
RB Clark	8/13/15	11:00	DEEP Shipping under Seal				
Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:

CHAIN OF CUSTODY

Department of Energy & Environmental Protection
Bureau of Air Management
Division of Radiation
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3029

15-08076

REC'D AUG 18 2015

Page 1 of 1

Project Name: NEAM DEEP Project					Sample Type				Container	Remarks
Samplers Signature: RBClark					Composite		Grab			
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid		
4	7/2/15	1310	NEAM 1C			X			500 ml manual	Dry Soil
5	7/2/15	1325	NEAM 2C			X			↓	↓
6	7/2/15	1340	NEAM 3C			X				
7	7/2/15	1355	NEAM 4C			X				
8	7/2/15	1440	NEAM 5C			X				

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
RBClark	8/13/15	11:00	DEEP Shipping under seal	UPS	8/18/15	1400	Kristen Carlson
Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
Ct Dept of Energy & Env Protection	DEPM1-0000039273	Environmental	08/18/2015	30	15-08076
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
DEPM1-0000039273	NEAM DEEP Project	H	09/10/2015	09/16/2015	09/17/2015

Internal ID	Client ID	Sample Date	Matrix	Storage	Gamma	TII
01	LCS	08/18/15	SO	G1.0	X	1
02	BLANK	08/18/15	SO	G1.0	X	1
03	DUP	08/18/15	SO	G1.0	X	1
04	NEAM 1C	07/02/15 13:10	SO	G1.0	X	1
05	NEAM 2C	07/02/15 13:25	SO	G1.0	X	1
06	NEAM 3C	07/02/15 13:40	SO	G1.0	X	1
07	NEAM 4C	07/02/15 13:55	SO	G1.0	X	1
08	NEAM 5C	07/02/15 14:40	SO	G1.0	X	1
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0
						0

Totals Per Analysis (non QA samples): 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

EBERLINE SERVICES

Sample Log In Report

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830

Voice: (865) 481-0683
Fax: (865) 483-4621

Invoice	Accounts Payable Ct DEEP Division of Radiation 79 Elm Street Hartford, Ct 06106	Report Data	Michael Firsick Ct DEEP Div of Radiation 79 Elm Street Hartford, CT 06106
Voice	860-424-3517	Voice	860-424-3517
Fax	860-424-4065	Fax	860-424-4065
Contact	Michael Firsick		
Voice	860-424-3517		
Fax	860-424-4065		

Printed: 8/18/2015 3:06 PM

15-08076

August 13, 2015

Attn: Sample Receiving

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830-7371

Please perform Gamma Spectroscopy analysis for the enclosed soil samples, isotope of interest is Ra-226

These samples are being shipped in 1 cardboard box. Standard turnaround is requested for these samples. When sample analysis is complete please mail a PDF CD of the final report to Mike Firsick at the address listed below. If you have any questions, please feel free to call me at 1-860-424-3534.

Please mail the results to the following address.

Attn: Mike Firsick
Division of Radiation
Department of Energy & Environmental Protection
79 Elm Street
Hartford, CT 06106

Thank you.

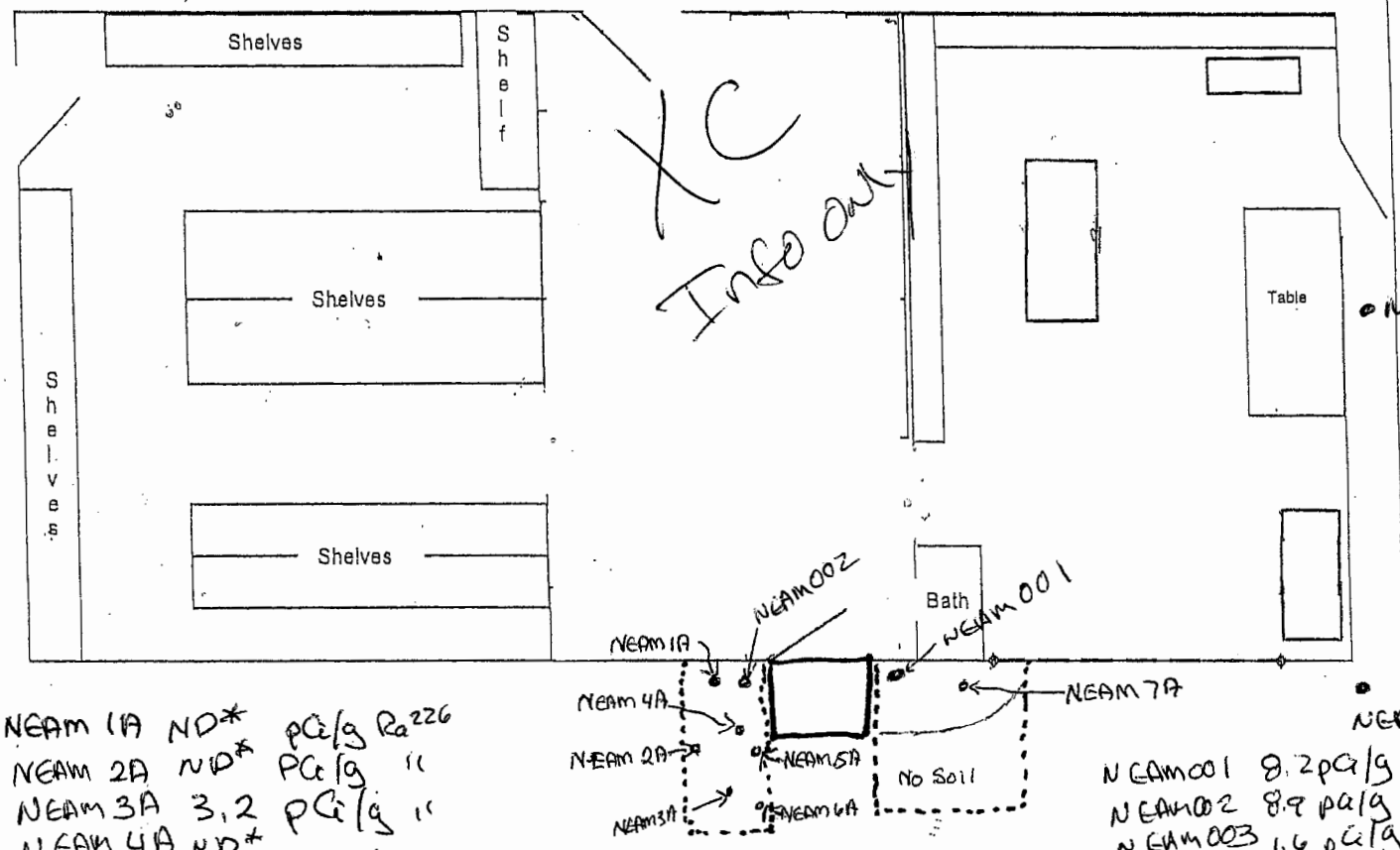
Bob Clark

RADIOLOGICAL SURVEY FORM

Location: NEAM Storage Building

Purpose: ~~Monthly Survey~~ Soil Sampling

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



XC
Info on

NEAM 1A ND* pCi/g Ra^{226}
NEAM 2A ND* pCi/g "
NEAM 3A 3.2 pCi/g "
NEAM 4A ND* "
NEAM 5A 0.8 pCi/g "
NEAM 6A 0.8 pCi/g "
NEAM 7A 5.72 pCi/g "

NEAM001 8.2pCi/g
NEAM002 8.9 pCi/g
NEAM003 1.6 pCi/g
NEAM004 1.2 pCi/g

ND - Not Identified MDA < 1.2 pCi/g

Comments:	Instrumentation	Key O=Smear Location, Dose Rate = (uRem/hr), "X"= Fixed (CCPM/DPM)α/β			
---- Area posted RAM	Make:	Model:	Serial #:	Cal Due:	QA Check:
	Make:	Model:	Serial #:	Cal Due:	QA Check:
See Attached results	Make:	Model:	Serial #:	Cal Due:	QA Check:
		Performed By RClark / G McCahill			Date: 9/26/14
Background (s) ND ≤ Background = α β		Reviewed By			Date:

15-08076

August 13, 2015

Attn: Sample Receiving

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830-7371

Please perform Gamma Spectroscopy analysis for the enclosed soil samples, isotope of interest is Ra-226

These samples are being shipped in 1 cardboard box. Standard turnaround is requested for these samples. When sample analysis is complete please mail a PDF CD of the final report to Mike Firsick at the address listed below. If you have any questions, please feel free to call me at 1-860-424-3534.

Please mail the results to the following address.

Attn: Mike Firsick
Division of Radiation
Department of Energy & Environmental Protection
79 Elm Street
Hartford, CT 06106

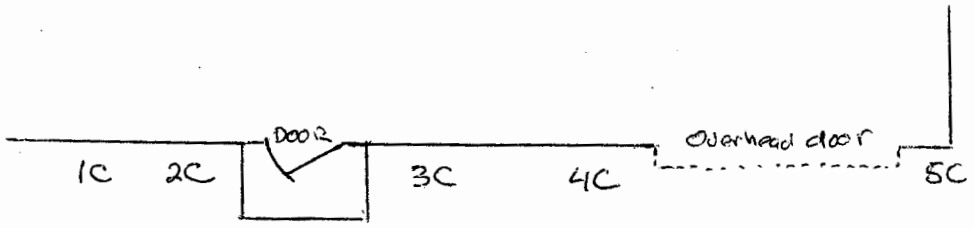
Thank you.

Bob Clark

RADIOLOGICAL SURVEY FORM

Location: NFAM Warehouse | Purpose: Post Remediation Soil Samples

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



Comments:	Instrumentation	Key O=Smear Location, Dose Rate = (uR/hr, mr/hr), "X"= Fixed (CCPM/DPM)α/β			
Composite Samples from each location	Make:	Model	Serial #	Cal Due	QA Check
	Make:	Model:	Serial #	Cal Due	QA Check
	Make:	Model	Serial #	Cal Due	QA Check
		Performed By [signature]		Date: 7/2/15	
Background (s) ND ≤ Background		Reviewed By		Date	

Post Remediation Soil Sample Results

Sample #	Reported Value (pCi/gm)	Background (pCi/gm)	Net Value(pCi/gm)
1C	1.42	1.0	.42
2C	2.35	1.0	1.35
3C	3.36	1.0	2.36
4C	1.23	1.0	.23
5C	1.53	1.0	.53

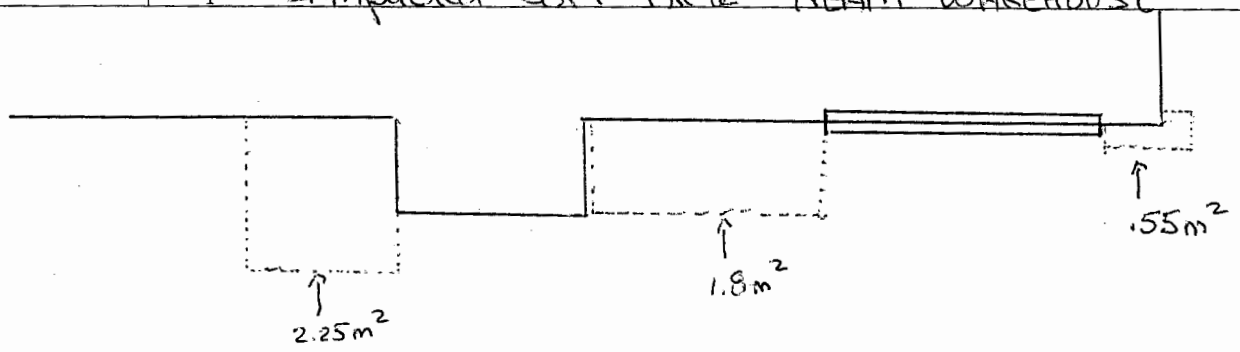
Highest reported value: 2.36 pCi/gm

RADIOLOGICAL SURVEY FORM

Location: NEAM WAREHOUSE

Purpose: Impacted Soil Area NEAM WAREHOUSE

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



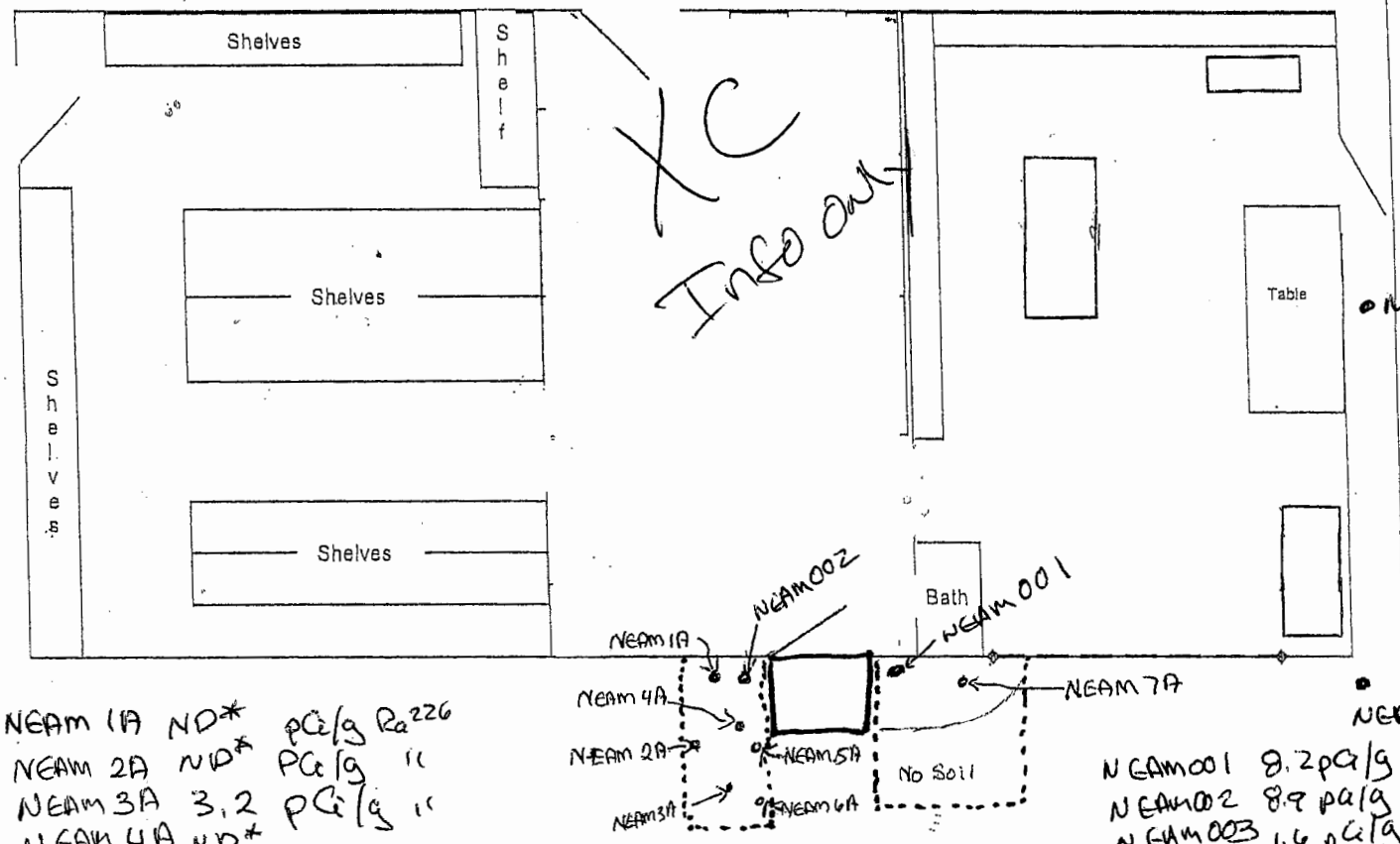
Total Area 4.6 m²

Comments:	Instrumentation	Key O=Smear Location, Dose Rate = (uR/hr, mr/hr), "X"= Fixed (CCPM/DPM)α/β			
	Make:	Model	Serial #	Cal Due	QA Check
	Make: NA	Model:	Serial #	Cal Due	QA Check
	Make:	Model	Serial #	Cal Due	QA Check
		Performed By RB Clark		Date: 7/23/15	
Background (s) ND ≤ Background		Reviewed By M. Trant		Date 8/5/15	

RADIOLOGICAL SURVEY FORM

Location: NEAM Storage Building | Purpose: ~~Monthly Survey~~ Soil Sampling

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



XC
Info out

NEAM 1A ND* pCi/g Ra^{226}
NEAM 2A ND* pCi/g "
NEAM 3A 3.2 pCi/g "
NEAM 4A ND* pCi/g "
NEAM 5A 0.8 pCi/g "
NEAM 6A 0.8 pCi/g "
NEAM 7A 5.72 pCi/g "

NEAM001 8.2pCi/g
NEAM002 8.9 pCi/g
NEAM003 1.6 pCi/g
NEAM004 1.2 pCi/g

ND - Not Identified mDA < 1.2 pCi/g

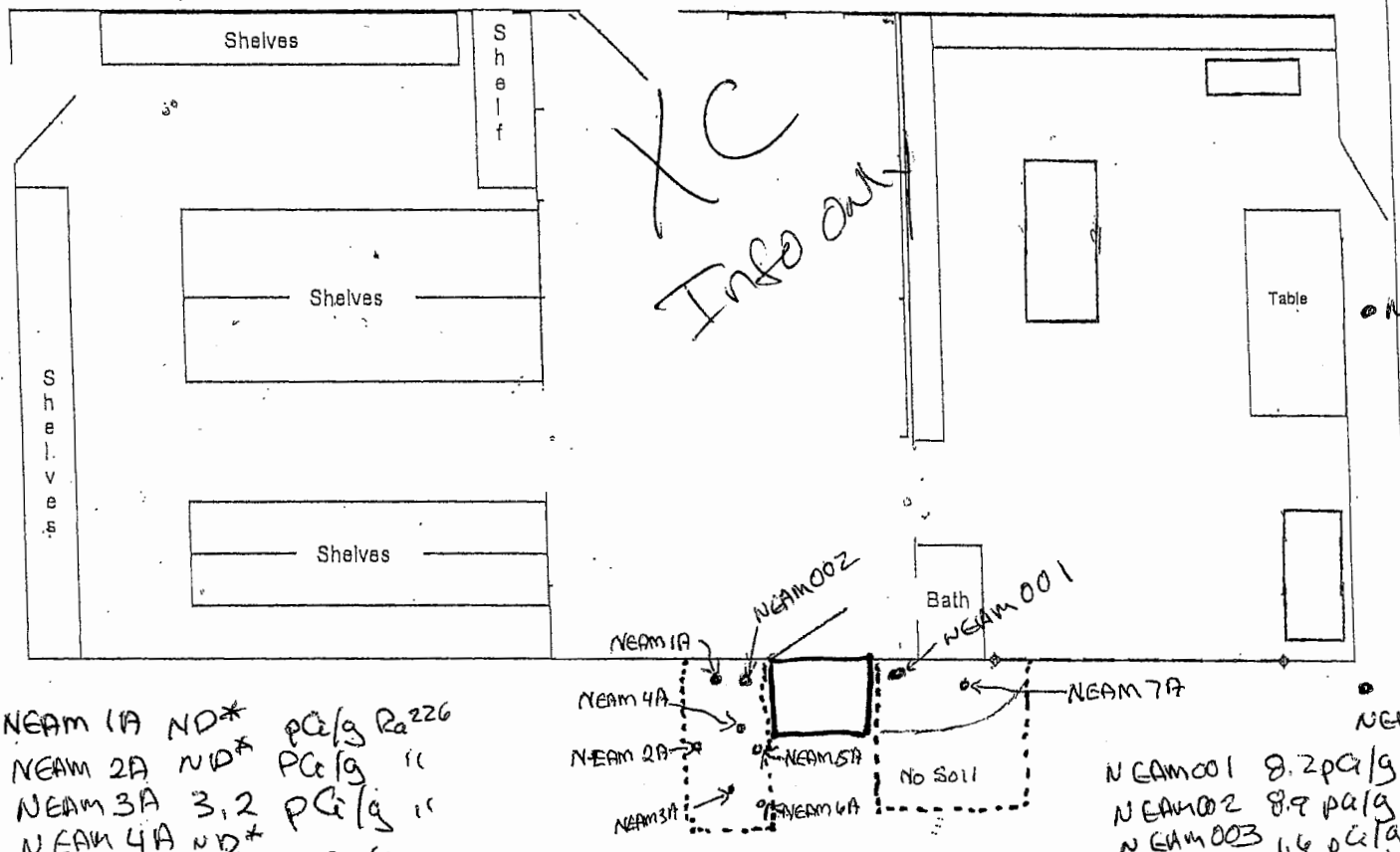
Comments:	Instrumentation	Key O=Smear Location, Dose Rate = (uRem/hr), "X"= Fixed (CCPM/DPM)α/β			
---- Area posted RAM	Make:	Model:	Serial #:	Cal Due:	QA Check:
	Make:	Model:	Serial #:	Cal Due:	QA Check:
See Attached results	Make:	Model:	Serial #:	Cal Due:	QA Check:
		Performed By RClark/G McCahill		Date: 9/26/14	
Background (s) ND ≤ Background = α β		Reviewed By		Date:	

RADIOLOGICAL SURVEY FORM

Location: NEAM Storage Building

Purpose: ~~Monthly Survey~~ Soil Sampling

Smear Number	DPM/100 CM^2 α	DPM/100 CM^2 β



XC
Info on

NEAM 1A ND* pCi/g Ra^{226}
NEAM 2A ND* pCi/g "
NEAM 3A 3.2 pCi/g "
NEAM 4A ND* pCi/g "
NEAM 5A 0.8 pCi/g "
NEAM 6A 0.8 pCi/g "
NEAM 7A 5.72 pCi/g "

NEAM001 8.2pCi/g
NEAM002 8.9 pCi/g
NEAM003 1.6 pCi/g
NEAM004 1.2 pCi/g

ND - Not Identified MDA < 1.2 pCi/g

Comments:

---- Area posted RAM

See Attached results

Instrumentation				
Make:	Model:	Serial #:	Cal Due:	QA Check:
Make:	Model:	Serial #:	Cal Due:	QA Check:
Make:	Model:	Serial #:	Cal Due:	QA Check:

Key O=Smear Location, Dose Rate = (uRem/hr), "X"= Fixed (CCPM/DPM)α/β

Performed By RClark/G McCahill Date: 9/26/14

Reviewed By Date:

Background (s) ND ≤ Background = α β

CHAIN OF CUSTODY

Department of Energy & Environmental Protection
Bureau of Air Management
Division of Radiation
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3029

Page 1 of 1

Project Name: NEAM DEEP Project					Sample Type				Container	Remarks
Samplers Signature: RBClark					Composite		Grab			
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid		
	7/2/15	1310	NEAM 1C			X			500 ML mason jar	Dry Soil
	7/2/15	1325	NEAM 2C			X				
	7/2/15	1340	NEAM 3C			X				
	7/2/15	1355	NEAM 4C			X				
	7/2/15	1440	NEAM 5C			X				

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
RBClark	8/13/15	11:00	DEEP Shipping under Seal				
Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:

CHAIN OF CUSTODY

Department of Energy & Environmental Protection
Bureau of Air Management
Division of Radiation
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3029

15-08076

REC'D AUG 18 2015

Page 1 of 1

Project Name: NEAM DEEP Project

Samplers Signature: [signature]

Laboratory Number	Date	Time	Sample Number	Sample Location	Sample Type: Composite Liquid	Sample Type: Composite Solid	Sample Type: Grab Liquid	Sample Type: Grab Solid	Container	Remarks
4	7/2/15	1310	NEAM 1C			X			500 ML manual	DRY Soil
5	7/2/15	1325	NEAM 2C			X			↓	↓
6	7/2/15	1340	NEAM 3C			X				
7	7/2/15	1355	NEAM 4C			X				
8	7/2/15	1440	NEAM 5C			X				

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
RB Clark	8/13/15	11:00	DEEP Shipping under Seal	UPS	8/18/15	1400	Kristen Carlson
Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
Ct Dept of Energy & Env Protection	DEPM1-0000039273	Environmental	08/18/2015	30	15-08076
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
DEPM1-0000039273	NEAM DEEP Project	H	09/10/2015	09/16/2015	09/17/2015

Internal ID	Client ID	Sample Date	Matrix	Storage	Gamma																								Tl
01	LCS	08/18/15	SO	G1.0	X																								1
02	BLANK	08/18/15	SO	G1.0	X																								1
03	DUP	08/18/15	SO	G1.0	X																								1
04	NEAM 1C	07/02/15 13:10	SO	G1.0	X																								1
05	NEAM 2C	07/02/15 13:25	SO	G1.0	X																								1
06	NEAM 3C	07/02/15 13:40	SO	G1.0	X																								1
07	NEAM 4C	07/02/15 13:55	SO	G1.0	X																								1
08	NEAM 5C	07/02/15 14:40	SO	G1.0	X																								1
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
																													0
	Totals Per Analysis (non QA samples)				5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

Sample Log In Report

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830

Voice: (865) 481-0683
Fax: (865) 483-4621

Invoice
Accounts Payable
Ct DEEP Division of Radiation
79 Elm Street
Hartford, Ct 06106
Voice 860-424-3517
Fax 860-424-4065

Contact
Michael Firsick
Voice 860-424-3517
Fax 860-424-4065

Report Data
Michael Firsick
Ct DEEP Div of Radiation
79 Elm Street
Hartford, CT 06106
Voice 860-424-3517
Fax 860-424-4065

Printed: 8/18/2015 3:06 PM

15-08076

August 13, 2015

Attn: Sample Receiving

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830-7371

Please perform Gamma Spectroscopy analysis for the enclosed soil samples, isotope of interest is Ra-226

These samples are being shipped in 1 cardboard box. Standard turnaround is requested for these samples. When sample analysis is complete please mail a PDF CD of the final report to Mike Firsick at the address listed below. If you have any questions, please feel free to call me at 1-860-424-3534.

Please mail the results to the following address.

Attn: Mike Firsick
Division of Radiation
Department of Energy & Environmental Protection
79 Elm Street
Hartford, CT 06106

Thank you.

Bob Clark

ATTACHMENT 8

Survey Results – Aircraft Stored Outside

RADIOLOGICAL SURVEY FORM

Location: NEAM Gauge Bldg Exterior Area	Purpose: Final Status Survey - Scans

Scanned areas, except for structures and buildings.

Areas not scanned due to obstruction.

All results less than scan MDC.

Comments:		Instrumentation				
E600	2241-2	Make: Ludlum	Model: 2241-2/ 44-2	Serial #: 222866	Cal Due: 10/12/17	QA Check: Sat
Bkg: 1.8 kcpm	Bkg: 1.0 kcpm	Make: Eberline	Model: E600 / SSPA3	Serial #: 03038	Cal Due: 6/13/18	QA Check: Sat
Eff%: 13.6 , Cs-137	Eff%: 3, Cs-137	Make:	Model:	Serial #:	Cal Due:	QA Check:
ScanMDC: 8.1 kdpm	ScanMDC: 27.3 kdpm		Performed By			Date: 7/17/17
			Reviewed By			Date: 7/24/2017

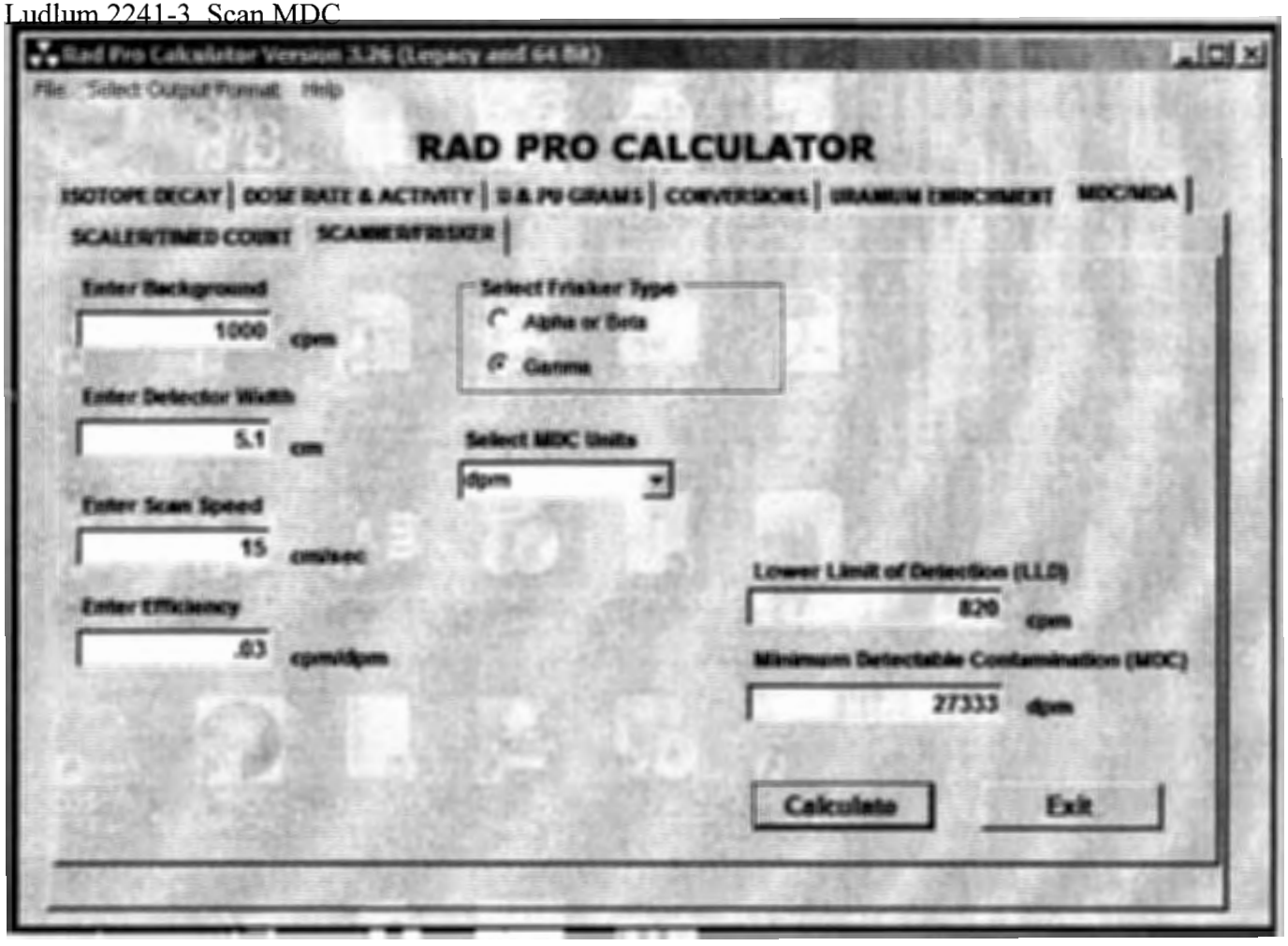
Background Count Determination

#	Eberline E600 w/ SSPA3, SN 03038 (kcpm)	Ludlum 2241-2 w/ 44-2, SN 235027 (kcpm)
1	1.75	1.00
2	1.82	1.06
3	1.78	1.03
4	1.72	.9
5	1.88	.97
6	1.82	.98
7	1.76	.94
8	1.99	1.11
9	2.0	1.00
10	1.74	1.01
Average	1.82	1.00

Instrument Operability Check

Eberline E600 w/ SSPA3, SN 03038 (kcpm)	Ludlum 2241-2 w/ 44-2, SN 235027 (kcpm)
Source: DEP-026 Cs-137 1 uCi	Source: DEP-026 Cs-137, 1 uCi
Pre: 155 kcpm	Pre: 68 kcpm
Post: 152 kcpm	Post: 69 kcpm

Ludlum 2241-3 Scan MDC



Eberline E600 Scan MDC