Connecticut Department of



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Affirmative Action/Equal Opportunity Employer

July 28, 2017

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

J6 03037785

REC RG 1 08 10 * 17 AMO6:11

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.

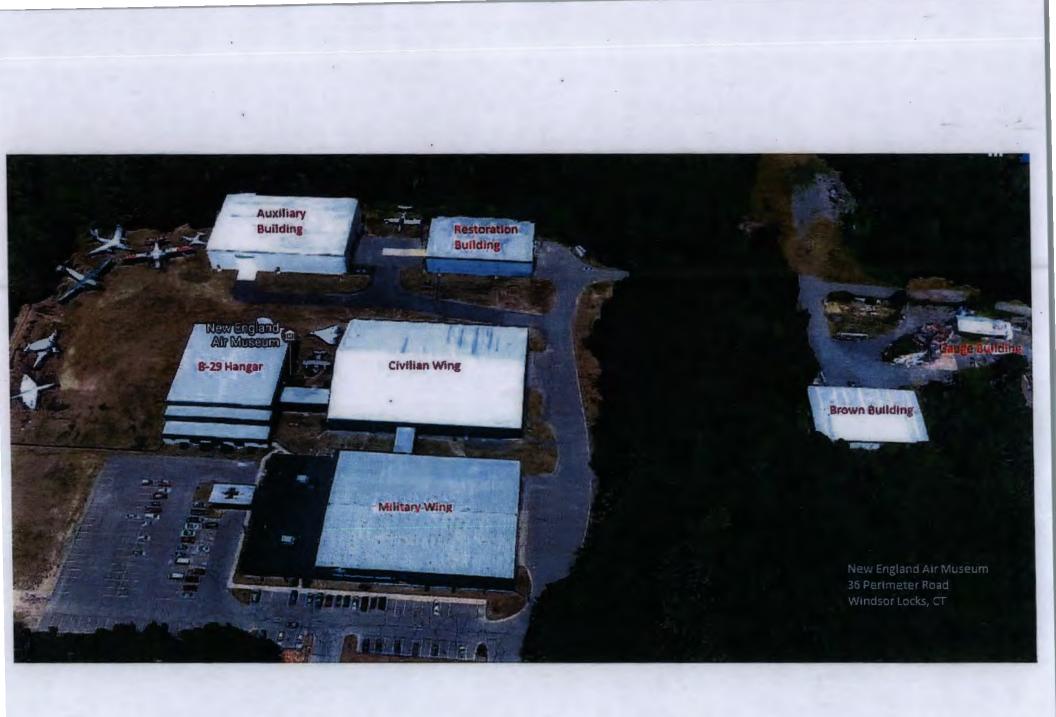
If you have any questions regarding this submittal, please contact the Radiation Safety Officer, Michael Firsick at (860) 424-3517 or <u>michael.firsick@ct.gov</u>.

Sincerely,

Jeffrey Semancik, Director Air Bureau, DEEP Radiation Division

594730

NMSS/RGN1 MATERIALS-002



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.

<u>RAI-1</u>

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.

<u>RAI-2</u>

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.

<u>RAI-3</u>

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 detector. All readings were below detection threshold. A survey map of the outside of the gauge building is provided as Attachment 6.

<u>RAI-5</u>

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 m² 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.

<u>RAI-6</u>

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

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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	
			- 1									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
			1									Package total	1.84E+00	4.97E-02	

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NOTE 1: Container Description Cades. For contai	ners/	Note 2: Weste Descriptor Codes. (C	Choose up to three which predominate by v	rokuma.)	Note 3: For solidification me	idia that meet diaposal alte	structural stability requirem	ients, the numerical code must	be followed by "-S."	
waste requiring disposal in approved structural overpacks,		20. Charcoal	29. Demolition Rubble	38. Evaporator Sottome/Studges/	For all solidification mode,	the vendor (menufacturer)	and onand name must also	be identified in item 13. Code	IDO = NONE REQUIRED.	
the numerical code must be followed by "OP ".		21. Incluention Ash	30. Cation ion Exchange Media	Concentration						
1. Wooden Box or Crete	9. Demineralizer	22. Skotj	31. Anion ion Exchange Media	39. Compactible Trash	Scrption				Soikification	
2. Metai Box	10. Gas Cylinder	23. Ges	32. Mixed Bed Ion Exchange Needa	40. Nancompactible Trash	60. Speedi Dri	85. Florco	73. Dicapert HP500	89. Other. Describe	90. Cement	100. None
3. Plastic Drum or Pall	11. Bulk, Unpackaged Wasta	24. OI	33. Contaminated Equipment	41. Aritmai Carosse	81. Celetom	67.Flores X	74. Petroeet	in item 13, or	81. Concrete (Encapsulation)	Required
4. Metai Drum or Pail	12. Unperinged Components	25. Aqueoua j.kauki	34. Organic Liquid (Except Oil)	42. Biological Metarlet (Except Anima) C	82. Floor Dry/	88. Solid-A-Serb	75. Petroset 1	additional pape	92. Bitumen	
6. Metal Tank or Uner	13. High Integrity Container	28. Filter Media	35. Gleaswere or Labware	Cerdena	Superfine	89. Chemail 30	76. Aquasel		93. Vinyi Chiaride	
6. Concrete Tenk or Liner	19. Other, describe in keyn 6,	27. Mechanical Filter	36. Sealed Source/Device	43. Activated Material	63. HI Dri	70. Chomel 50	77. Aquaeet II		94. Vinyl Ester Otyrena	
7. Polyachylana Tank or Liner	ot ádditional page.	26. EPA or State	37. Paint or Plating.	59. Other, Describe in lists 11, or	64. Safe-T-Sorb	71. Chemail 3030			99. Other. Describe in flow 13,	
8. Fiberglass Tank or Uner		Hezerdova		Additional Page	85. Safe-N-Dri	72. Diceperi HP200			or Additional Page	

12 1

NRC FORM 541A										US NUCLEAR REGU	LATORY COMMIS	SION	2. MANIFEST	NUMBER	
				UNIFOR			DACTIVE							TO-2014-1	05
				CONTA		MANIFEST	UPTION						3 PAGE_2_OF	2_PAGE(S)	
						-							L		
	DISPO	SAL CONT	AINER DESC	the second s				the second s	and the second se	and the second	THE R. P. LEWIS CO., LANSING, MICH.	PE IN CONTAINE	The second s		16. WASTE
5. CONTAINER	6	7	8	9. SURFACE		RFACE		YSICAL DESCRI	the state of the s	14. CHEMICAL D		the second s	OGICAL DESCRIPT		CLASS
IDENTIFICATION	CONTAINER		WASTE AND	RADIATION		NINATION	11. WASTE	12. Approximate	13. SORBENT		WEIGHT	INDMOUAL RAIONUCLIDE			AS-A STABLE
NUMBER/	DESCRIPTION	VOLUME	CONTAINER	LEVEL	MBq/1	00 cm2	DESCRIPTOR	WASTE VOLUNE(B)	SOLIDIFICATION	CHEMICAL FORM /	% CHELATING	CONTAINER TOTAL: OR CO			AU-A UNSTABLE
GENERATOR	(See Note 1)	(m3)	WEIGHT	_X_ uSv/hr		BETA-		IN CONTAINER	STABILIZATION	CHELATING AGENT	AGENT		DIONUCLIDE PERCENT		B-CLASS B
NUMBER		0.010	(kg)	mSv/hr	ALPHA	GAMMA	(See Note 2)	(m3)	MEDIA (See Note 3)	Out-AIR		Nuclide		mCi	C-CLASS C
TO-CT-E-14-201 1347	4	0.212		7	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7.40E-01	2.00E-02	NA
1047															
			54												
												Package total	7.40E-01	2.00E-02	
TO-CT-E-14-202	4	0.212		5	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	3.66E-01	9,90E-03	NA
1347			63												
			6			ł									
				1				1							
												Package total	3.66E-01		
TO-CT-E-14-203	4	0.212		13	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	1.10E+01	2.98E-01	NA
1347				1				1	1						
			54.5			1		1				1			
				1		1						Package total	1.10E+01	2.98E-01	
TO-CT-E-14-204	4	0.212		6	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Package total Ra-226	3.66E-01	9.90E-03	NA
1347			100	t Ť	0.07 2 0										
			59,5			1									
						1		1	ſ	1					
		L										Package total	3.66E-01	9.90E-03	
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NRC FORM 542	2	U.S. NUCLEAR REGULATO	RY COMMISSION	1.	WASTE COLLECTO	R/PROCESSO	R			2. MANIFEST NUMBER	
(5-1998)				NAME				SHIPPER USE ON	ILY		
	U	NIFORM LOW-LEVEL RADIOACTIN	/E	Chase Enviro	onmental Gro	oup, Inc.				TO-2014-	105
		WASTE MANIFEST)	IDENTIFICATION I				1			
				T-KY003-L14	ŧ.			1		3.	
	MAN	FEST INDEX AND REGIONAL COMPACT TABULA	ATION	SHIPPING DATE				1	1	PAGE_1_OF_1_	PAGE(S)
		ginal "PROCESSED WASTE" before "COLLECTED		4/23/2014							
4.		5.	ß.	7.	8,	8,	10.	11.	AS PROCESSED/CO	OLLECTED TOTAL	1. C
G	ENERATOR	GENERATOR NAME	GENERATOR	PREPROCESSED	NANIFERT NUMBER	WASTE	ORIGINATING				
(DE	INTIFICATION	PERMIT NUMBER	FACILITY	WASTE	UNDER WHICH WARTE	CODE	COMPACT	A. SOURCE	B. SNM	C. ACTIVITY	D. VOLUME
	NUMBER	AND TELEPHONE NUMBER	ADDRESS	(OR MATERIAL)	(OR MATERIAL)	7-MOX688ED	OR	MATERIAL			
1				VOLUME	RECEIVED AND DATE	DHOOLLEDTED	STATE			(MBq)	(m3)
1				(m3)	OF RECEIPT			(kg)	(9)		1 1
1											
	1347	CT DEEP/New England Air Museun	36 Perimeter Rd.	2.120	NA	С	CT	0.00E+00	NP	2.91E+01	2.120
			Windsor Locks, CT 06096		i i						1 1
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NRC FORM 542 (5-1996)

	Chase Environ	mental Group, Inc.	N/A	7. NRC FORM 540 AND 540A PAGE 1 NRC FORM 541 AND 541A OF	_1_PAGE(8)			tion pages)
	Louisville, K	Y 40299	X COLLECTOR PROCESSOR	NRC FORM 542 AND 542A ADDITIONAL INFORMATION	_1_PAGE(S) None_PAGE(S)		TO-2014-2	31
			GENERATOR TYPE (SPECIFY)		DRESS	Contact	Rick I	OW
	CONTACT		TELEPHONE # 865-481-8801	109 Flint Road		Telephone I	Number (Includ	e area code)
			EPA ID #		redging weste reclept	Date		
3	PO Box 169)	SHIPPING DATE	This is to certify that the herein nemaci meterials are proparticilate	10. Certifi	ication	condition for transportation a	
WBER	CONTACT		TELEPHONE # 856-769-2741	to the applicable regulations of the Dapatiment of Transportation.	This sho certifies that the materials are of	mailed, seckaged, math t perts 20 and 81, or equ	ard and tabeled and are in Instant state requisitors.	
		Came	DATE \$ 20/14	AUTHORIZED SIGNATURE	TITLE Tech			DATE ZO/(4
12 DOT LABEL	13 TRANSPORT	14 PHYSICAL AND		15 INDIVIDUAL	16 TOTAL PACKAGE		15. TOTAL WEIGHT OR VOLUME	19. ID NUMBER OF
(01)00	D,)	CHEMICAL FORM Solid/Oxide	Ra-226	ADIONUCLIDES	2.39E+00	NA	0.212	PACKAGE TO-CT-E-14-490 (NEAM #11)
	0.2	Solid/Oxide	Ra-226		3.54E+00	NA	0.212	TO-CT-E-14-49 (NEAM #12)
Yellow H	Dið	Solid/Oxide	Ra-226	1997 - Barre Alexandra, en 1997, en <u>1997</u> , en 1997, en	4.51E+00	NA	0.212	TO-CT-E-14-49 (NEAM #13)
					,			
			The constituents o	f the waste manifested here				
			Michael E Print name	Firsock		nd	(8/20/14 Date
	3 IBER 12 DOT LABEL ADIOACTIVE"	Chase Environ 11450 Watt Louisville, K USER PERMIT NU T-KY003-L1 CONTACT Ja 6. CARRIER N SJ Transpo 3 PO Box 165 Woodstowr BER CONTACT K SIGNATURE DONTACE 12 13 TRANSPORT ADIOACTIVE 13 TRANSPORT ADIOACTIVE (1) (1) (2) (1) (Chase Environmental Group, Inc. 11450 Watterson Court Louisville, KY 40299 USER PERMIT NUMBER T-KY003-L14 CONTACT Janet Baker 6. CARRIER NAME AND ADDRESS SJ Transportation Co., Inc. 3 PO Box 169 Woodstown, NJ 08098 IBER CONTACT Kevin Elder BIGNATURE Display Grune 12 13 14 PHYSICAL AND CHEMICAL FORM (e) 100 Display CONTACT Solid/Oxide CONTACT Solid/Oxide	Chase Environmental Group, Inc. 11450 Watterson Court Louisville, KY 40299 USER PERMIT NUMBER T-KY003-L14 CONTACT Janet Baker S. CARRIER NAME AND ADDRESS S. CARRIER NAME AND ADDRESS BHIPPING DATE BIONATURE DO DO 169 Woodstown, NJ 08098 CONTACT ELEPHONE # 856-769-2741 BIONATURE DATE DATE DATE J. CONTACT I LABEL I RANSPORT I D. D Solid/Oxide T. CONTACT PHYSICAL AND ADDACTIVE NDEX CHEMICAL FORM RE-226 CONTACT CONTACT RE-226 CONTACT CONTACT RE-226 CONTACT CONTACT CONTACT RE-226 CONTACT CONTACT CONTACT RE-226 CONTACT CONTACT CONTACT RE-226 CONTACT CONTACT CONTACT RE-226 CONTACT CONTACT CONTACT CONTACT CONTACT RE-226 CONTACT CONTAC	Chase Environmental Group, Inc. 11450 Watterson Court N/A NRE FORM 54 AND 54A OF Louisville, KY 40299 PROCESSOR ADDITAL INFORMATION NRE FORM 54 AND 54A ADDITAL INFORMATION USER PERMIT NUMBER SHIPMENT # SHIPMENT # SHIPMENT # CONSIGNE 4AWE AND FADLITY ACT TOXCO, Inc. T-KY003-L14 N/A TELEPHONE # CONSIGNE 4AWE AND FADLITY ACT TOXCO, Inc. 109 Flint Road B. CARRIER NAME AND ADDRESS SJ Transportation Co., Inc. NJD071629976 StoRATURE-Authoritzed comagnee acknow 3 PO Box 169 SHIPPIND DATE SHIPPIND DATE Woodstown, NJ 08098 SHIPPIND DATE SHIPPIND ADTE BER CONTACT TELEPHONE # TeLEPHONE # 12 13 PHYSICAL AND TOUNDUL 13 PHYSICAL AND NDIVIDUAL ADDATE Solid/Oxide Ra-226 11 D.J Solid/Oxide 11 D.J Solid/Oxide 11 Solid/Oxide Ra-226 11 Solid/Oxide Ra-226 11 Solid/Oxide Ra-226 11 Solid/Oxide Ra-226 11 Solid/Oxide Ra-226	Chase Environmental Group, Inc. 11450 Watterson Court Louisville, KY 40299 USER PERMIT NUMEER SIGNATURE CONTACT CO	Chase Environmental Group, Inc. 11450 Waterson Court Louisville, KY 40299 User REMIT NUMBER User REMIT NUMBER User REMIT NUMBER CONTACT CONT	Chase Environmental Group, Inc. N/A Inc. Integration Image: Anomaly and Mich OF Image: Anomaly An

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CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 541			US NUCLEAR REGU	ATORY COMMISSIC	N			1. MAN	FEST TOTALS				2. MANIFEST N	UMBER	
						NUMBER OF	NET WASTE	NET WASTE	SP	ECIAL NUCLEAF	R MATERIAL (g	rams)			
	UNIFORM	LOW-LEV	EL RADIOA	CTIVE		PACKAGES	VOL. m3	WGHT kg	U-233	U-235	Pu	TOTAL		TO-2014-2	231
	-		ANIFEST	ION		3	0.636	356	NP	NP	NP	NP	3. PAGE1_OF_1	1_PAGE(S)	
								ACTIV	TY (MBq/mCl)			SOURCE	4. SHIPPER NA	ME	
						ALL NUC		TRITIUM	C-14	To-99	I-129		Chase Enviro		Group
						1.04E+01		NP	NP	NP	NP	0.00E+00	SHIPPER ID NU		
						2.82E-01	mCi							N/A	
	D	SPOSAL C	ONTAINER DES	CRIPTION					WASTE DESCR	RIPTION FOR EA	CH WASTE TY	PE IN CONTAINER			16. WASTE
5. CONTAINER	6	7	8	9. BURFACE	10. 80	RFACE	P	HYSICAL DESCR	IPTION	14. CHEMICAL	DESCRIPTION	15. RADIO	LOGICAL DESCRIPTI	ON	CLASS
IDENTIFICATION	CONTAINER		WASTE AND	RADIATION	CONTAM		11, WASTE	12. Approximate	13. SORBENT		WEIGHT	INDIVIDUAL RAIONUGLIDES	AND ACTIVITY (MBq) AN	D	AS-A STABLE
NUMBER/	DESCRIPTION	VOLUME	CONTAINER	LEVEL	MBq/10	00 cm2	DESCRIPTOR	WASTE VOLUME(S)	SOLIDIFICATION	CHEMICAL FORM /	% CHELATING	CONTAINER TOTAL: OR CO	NTAINER TOTAL ACTIVIT	Y	AU-A UNSTABLE
GENERATOR	(See Note 1)	(m3)	WEIGHT	_X_u8v/hr		BETA-		IN CONTAINER	STABILIZATION	CHELATING AGENT	AGENT		DIONUCLIDE PERCENT		B-CLASS 8
NUMBER			(kg)	mBv/hr	ALPHA	GANNA	(See Note 2)	(m3)	MEDIA (See Note 3)		IF > 0.1%	Nuclide		mCi	C-CLASS C
TO-CT-E-14-490	4	0.212			<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	2.39E+00	6.45E-02	NA
1347			131	10									0.000.000		
										0.11.010		Package total			
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		
			L								L	Package total	3.54E+00	the second s	
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-228 Package total	4.51E+00	1.22E-01	
		<u> </u>				<u> </u>		t		<u> </u>		Fackage with	4.012100	1.446-01	<u>+</u>
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NOTE 1: Container Description Codes. For conta	iners/	Note 2: Waets Descriptor Codes. (C	thoose up to three which predominate by a	rolume.)	Note 3: For solidification me	die thet meet disposel site	einuokural etabliiky pequirem	ients, the numerical code must	be followed by "-8."	
waste requiring disposal in approved structural overpacks,		20. Charcoal	29. Demoition Rubble	38. Evaporator Bottoma/Skudges/	For all colidification media, t	he vendor (menufacturer) (end brand name must also	be identified in term 13. Code 1	100 - NONE REQUIRED.	
the numerical code must be followed by "OP ".		21. Incinamior Ash	30. Cation Ion Exchange Media	Concentrates						
1. Wooden Box or Crate	9. Demineralizer	22. Soli	31. Anion ion Exchange Modia	39. Compactible Tresh	Sorption				Solidification	
2. Metal Báx	10. Ges Cylinder	23. Ges	32. Mixed Bed ion Exchange Media	40. Noncompactible Trash	60. Speed Dri	88, Flores	73. Dicepert HPS00	B9, Other. Describe	90. Cement	100, None
3. Piestic Drum or Pall	11. Bulk, Unpeckaged Waste	24. OI	33. Contaminated Equipment	41. Animel Curcans	61. Celetom	67,Florce X	74. Petroaet	in item 13, or	91. Concrete (Encapeulation)	Required
4. Motel Drum or Pes	12. Unpeckaged Components	25. Aqueous Liquid	34. Organic Liquid (Except Oil)	42. Biological Material (Except Animal C	82. Floor Dry/	58, Solid-A-Sorb	75. Petroset II	addilional page	92. Bitumen	
5. Metal Tank or Liner	13. High Integrity Container	26. Filter Media	35. Gissevere of Labware	Caroas	Superfine	69. Chemaii 30	76. Aqueet		93. Vinyi Chiande	
6. Concrete Tank or Liner	19. Other, describe in kem 6,	27. Mechanical Filter	38. Bealed Source/Device	43. Activated Material	63. HI DH	70. Chemeil 60	77. Aquatet II		94. Vinyi Ester Styrens	
7. Polyathylana Tinck or Liner	or additional page	28. EPA or State	37. Paint or Plating	59. Other. Describe in item 11, or	64. Safe-T-Soit	71, Chemail 3030			99. Other. Describe in item 13,	
8. Fiberginen Tenk or Liver		Hezerdous		Additional Page	65, Safe-N-Dri	72. Dicaperi HP200			or Additional Page	

NAME MARE TO-2014-231 MARE	NRC FORM	542	U.S. NUCLEAR REGULATO	RY COMMISSION	1.	WASTE COLLECTO	R/PROCESSO	R			2. MANIFEST NUMBER		
Chase Environmental Group, Inc. TO-2014-231 MARTER MANIFEST Chase Environmental Group, Inc. TO-2014-231 MARTER MARTER MARTER MERION Chase Environmental Group, Inc. MARTER MARTER MARTER MERION Chase Environmental Group, Inc. MARTER MARTER MERION BERMOR MARTE TO-2014-231 MARTER MARTER MERION MARTER MARTER MERION MARTER MARTER MARTER MARTER MARTER MERION MARTER MARTER MERION MARTER MARTER MERION MARTER MARTER MARTER MERION MARTER MARTER MERION MARTER MARTER MARTER MERION MARTER MARTER MARTER MERION MARTER MARTER MARTER MERION MARTER MARTER MARTER MARTER MERION MARTER MARTER MARTER MARTER MERION MARTER MARTER MARTER MARTER MERION MARTER MARTER MARTER MERION MARTER MARTER MARTER MERION MARTER MARTER MARTER MERION MARTER MARTER MARTER MERION MARTER MARTER MARTER MARTER MARTER MARTER MERION MAR					NAME				SHIPPER USE ON	ILY	-		
T-KY003-L14 I.MANFEST NDEX.ND REGIONAL COMPACT TABULATION LIAT de organial (PROCESSED WARTE' Winey COLLECTED WARTE') LAN de organial (PROCESSED WARTE') Auger Manager Zamato Status Zamato Status Martine Martine Martine Association Status Martine Association Status Martine Association Status Martine Martine Martine Association Status Association S		L L	JNIFORM LOW-LEVEL RADIOACTI	VE	Chase Enviro	onmental Gro	up, Inc.				TO-2014-	231	
MARKET NORSE TAD REGIONAL COMPACT TABULATION SHIPPED DATE SHIPPED CORES SHIPPED CORES PACE_1_OF_1_PACE(S) Lut al loginal reprocessed water deservices Control A Control SHIPPED CORES SHIPED CORES SHIPPED CORES			WASTE MANIFEST		IDENTIFICATION !	NUMBER]				
Let al rogical "PROCESSED WASTE" before SCULLECTED WASTE". 8/20/2014 Supermission It. A second secon					T-KY003-L14	l .					3.		
A. B. GENERATOR DESTRICTION INMEER B. F. <		MA	NIFEST INDEX AND REGIONAL COMPACT TABUL	ATION	SHIPPING DATE				1		PAGE_1_OF_1	PAGE(S)	
OBJERATOR DENTROLING NUMBER OBJERATOR PRINT RUDBER OBJERATOR PRINT RUDBER PREPROCESSO PAGINT' ADDRESS UNMER (matter) (m		List all o	riginal "PROCESSED WASTE" before "COLLECTED	D WASTE".	8/20/2014								
DEBITIONON NUMBER PERMIT NUMBER PACUTY ADDRESD WATT (MITTENL) (M) (MITENL	4.		5.	6.	7.	8.	9.	10.	11.	AS PROCESSED/C	OLLECTED TOTAL		
NUMBER ADD TELEPHONE NUMBER ADDRESS (MI INTENUL) VOLUME (N) (MI INTENUL) VOLUME (N) (MI INTENUL) (N) (MI INTENUL) (N) </td <td></td> <td>GENERATOR</td> <td>GENERATOR NAME</td> <td>GENERATOR</td> <td>PREPROCESSED</td> <td>MANFEST NUMBER</td> <td>WASTE</td> <td>ORIGINATING</td> <td></td> <td></td> <td></td> <td></td>		GENERATOR	GENERATOR NAME	GENERATOR	PREPROCESSED	MANFEST NUMBER	WASTE	ORIGINATING					
Image: Name of the second o		IDENTIFICATION	PERMIT NUMBER	FACILITY	WASTE	UNDER WHICH WASTE	CODE	COMPACT	A. SOURCE	B. SNM	C. ACTIVITY	D. VOLUME	
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 1 1 1 1 1 1 1 1 1 1 1 0.636 1		NUMBER	AND TELEPHONE NUMBER	ADDRESS	(OR MATERIAL)	(OR MATERIAL)	P-PROCAMED	OR	MATERIAL				
1347 CT DEEP/New England Air Museum 980-623-3305 36 Perimeter Rd. Windsor Locks, CT 06096 0.836 NA C CT 0.00E+00 NP 1.04E+01 0.636					VOLUME	RECEIVED AND DATE	C-COLLEPTED	BTATE			(MBq)	(m3)	
B60-623-3305 Windsor Locks, CT 06096 Image: Comparison of the second se					(m3)	OF RECEIPT		1	(kg)	(g)			
B60-623-3305 Windsor Locks, CT 06096 Image: Comparison of the second se								i					
880-623-3305		1347			0.636	NA	C	СТ	0.00E+00	NP	1.04E+01	0.636	
	1			Windsor Locks, CT 06096				l					
Image: Second			860-623-3305			·······	· · · · · ·						
Image: Second	1						1			1			
Image: Solution of ALL PAGES (NRC FORMS 642 AND 542A) 0.000 1.04E+01 0.636	1									1			
Image: Solution of the second seco							<u> </u>		_	ļ			
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TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A) 0.000 1.04E+01 0.636									1	1	1		
TOTALS OF ALL PAGES (NRC FORMS 642 AND 542A) 0.000 0.000 1.04E+01 0.636										1			
TOTALS OF ALL PAGES (NRC FORMS 642 AND 542A) 0.000 1.04E+01 0.636									+	+	+	 	
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A) 0.000 1.04E+01 0.636			1						1		1	1	
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A) 0.000 0.000 1.04E+01 0.636									1				
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A) 0.000 1.04E+01 0.636			+		<u> </u>			1	1				
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A) 0.000 1.04E+01 0.636				1						1			
TOTALS OF ALL PAGES (NRC FORMS 542 AND 542A) 0.000 1.04E+01 0.636													
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NRC FORM 542 (5-1998)

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						nmental Group		N/A	HERE POILS BAT AND BATA	OF	7_PAGE(0)	the the work	ter na at containat	ma baller)
		W-LEVEL RAI				llerson Cou	rt	X COLLECTOR	NIK: POAN BAD AND SADA		PAGE(0)			
	WA	STE MANIFES	BT		Louiaville,			PROCESSON	Allan ta mili, deficienti i m		None_PAGE(8)		TO-2014-1	05
	51	IPPING PAPER				Amr A	SINGLENT #	MINERATOR THE INCOME	I COMMONES HAME AND T	ACILITY ADD	HEAD	Contact		
ENERGENCY TE	ILL PHONE HUMBE (MICLU	DE ANTA CODES			T-KY003-L	.14	N/A		TOXCO, Inc.				Rick L	OW .
	800-424-930	0			CONTACT		········		109 Flint Road		ſ	Telephone h	limber (Inclus	nne colio)
DINGANIZATION					l s	eb Cannata	1	860-308-0195	Oak Ridge, TN 37	830			665-482	-5532
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		T TOTAL ALANDER		T		ortation Co.		NJD071629976						
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11 08	DEPARTMENT OF THAT	MORITATION DESCR	PTION	10		1 14			15		69	17		10 47
finded	und haden systems incov	harant mass, LNI 10, ~		DOT CARE	INANOPOWI	mener	AL AND		HOWYOUN		TOTAL PACKAGE	LEANSCO	OR VOLUM	NR MARLE IN COF
	and sity at Stand	Manage Al		WADROACTIVE"	wark x	CHEMCA	I FORM		KADIONUCLIER		ACTIVITY IN MBq	CLASS	m,	PACKAGE
UN2015 Ra	adioactive maleri	al, Type A pa	ckage, 7	Yellow-II		Solid/	Oxide	Ra-226			5.51E+00	NA	0.212	TO-CT-E-14-10
			-	1	0.2									(NEAM #3)
One drum v	with DAW for dis	posal			Ura	ł								
UN2915 Ra	adioactive materi	al. Type A pa	ckano, 7	Yellow-II		Solkt	Oxide	Ro-226			7.36E+00	NA	0.212	TO-GT-E-14-190
					10 7									(NEAM #10)
One drum v	with DAW for dis	posal			0.2									
	adioactive maleri		ckano, 7	Yellow-II		Solid/	Oxide	Ra-226			7.40E-01	NA	0.212	TO-CT-E-14-18
				1	0,1								1	(NEAM #1)
Con down a	with DAW for dis	naeat				1								
	adioactive materi		ckago 7	While-I		Solid	Oxide	Ra-226			3.06E-01	NA	0.212	TO-CT-E-14-19
012015 10			evalia. v	wwinter.	NI.	0000	0.100	()H-640					0.2.12	(NEAM #2)
Ciert days	with PANAt for dia				NA							1		(12) 01 02)
	with DAW for dis		akana 7	White-I		Solid	Oxide	Ra-226	······································		7.40E-01	NA	0.212	TO-CT-E-14-19
UNZUIGING	adioactivo materi	ai, rypo A pa	ckage, /	VVIIIQ-I	NI	5010	CARGE	110-220			1.400-01		0.212	(NEAM #4)
					A/						1			(1412) (1414)
	with DAW for dis				-	6 + 17 - 1	Ouldo	Ra-228			1.84E+00	NA	0.212	TO-CT-E-14-20
UN2915 Rd	adioactivo materi	ai, Type A pa	icxage, 7	White-I	N/.	50110/	Oxide	HB-220			1.042+00		0.212	(NEAM 45)
					AI									(142200 45)
One drum	with DAW for dis	posal												
					1	1	w					L	. I	1
									cation Statement:					
								The constituents	of the weste manife	sted no	rein are known to	ina gene	rator. Ther	B BIG NO EPA
1								RCRA, pathoger	ic or other hazarda	present	other than those	spocifical	y isted on i	ne Form 541.
1											\cdot	~		1 .
								140 . 1-		11 -	DA L	-0-		410-21
								Muhale	<u>ricseer</u>	Who -	Khe Tu	me.		TLAST
								Print name			Signaturo			Date

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CONSIGNEE ORIGINAL (MUST ACCOMPANY WASTE IN TRANSIT)

NRC FORM 540A					U.S. NUCLEAR REGULATORY	COMMISSION	a. Manifest I	Vumber	
			LOW-LEVEL RA				(Une this reard	har on all continuation	pages)
			NASTE MANIFE					TO-2014-1	AC
		01111111	IG PAPER (CONTI				PAGE 7 ()	F_2_PAGE(8)	05
IT U & DEPARTMENT OF TRANSPORTATION DESCRIPTION	12	13	14		19	16	11		19 10
(Industing proper shipping name, hazard class. UNIC number	DOTLASEL	TRANSPORT	PH15ICAL AND		MOTVIDUAL	TUTAL PACKAGE	LANISCO	ON VOLUME	HUMBER OF
and any editional rites waters	-	MEXER	CIRMICAL FORM		RADIONUCLIDES	NUMPER DUPPE	CLADD	m³	PACHADE
UN2915 Radioactive material, Type A package, 7	Yeilow-II	0.1	Solid/Oxide	Ra-226		7.40E-01	NA	0.212	TO-CT-E-14-201 (NEAM #6)
One drum with DAW for disposal		• • •	0.11.110	D - 000		0.005.04			
UN2915 Redioactive material, Type A package, 7	Yellow-II	0.1	Solid/Oxide	Ra-226		3.66E-01	NA	0 212	TO-CT-E-14-202 (NEAM #7)
One drum with DAW for disposal UN2915 Radioactive material, Type A package, 7	Yellow-II	· · ·	Solid/Oxide	Ra-226		1.10E+01	NA	0.212	TO-CT-E-14-203
One drum with DAW for disposal		6.3	20110/Oxide	R8-220		1.102701	NV4	0.212	(NEAM #8)
UN2915 Radioactive material, Type A package, 7 One drum with DAW for disposal	Yeliow-li	0,1	Solid/Oxide	Ra-226		3.66E-01	NA	0.212	TO-CT-E-14-204 (NEAM #9)
				<u></u>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				

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CONSIGNEE ORIGIN (MUST ACCOMPANY WAS IN TRANSIT)

RC FORM 541			US FRICLE AN HEOUR	LATON / COAMANNO	-1			T. MAY	FEST TOTALS				7 MANAPEST IR	MUEN	
								METYMANTE	SP	ECIAL NUCLEAR	MATERIAL (rama)			
	UNIFORM	LOW-LEV	EL RADIOA	CTIVE		PACHAIRS	VOL AN	er inches	U-233	U-235	Pu	TOTAL	1	ro-2014-1	105
	-		ANIFEST	ION		10	2.120	708	NP	NP	NP	NP	3. PAGE_1_OF_2	PAGE(S)	
								ACTIM	TY (MB-MACO			SOURCE	4. SHIPPER NA	ME	
						ALL NUE	Laves	TRITUM	C14	10.44	1-129	(1.0)	Chase Enviro	nmental (Group
						2.91E+01	MBg	NP	NP	NP	NP	0.00E+00	SHIPPER ID NU	MOER	
						7.85E-01	mCi							N/A	
	D	SPOSAL C	ONTAINER DES	CRIPTION					WASTE DESCR	IPTION FOR EA	CH WASTE T	PE IN CONTAINER			-
S CONTAINER	9	1	•	B BURNALE	10 m.	MALE.	p	HYGICAL DESCR	IPTION	14 CHENICAL	DE BORNPINDES	16 N.42HO	LOOKCAL DESCRIPTIC	×	CIANS
IOSHITIPICATION	CONTAINER		WARTE MAD	SACIA TILIM	CONTAG	EN LON		12 Approxim	12 BC# BERT		HI CONT	HEMOLIAL RACINGS CON	AND ACTIVITY dating And	>	
HUMMER	OF REAMPTICAN	VICUME	CONTAINEN	LEVEL	Littley's	00 om3			A TEADY ISA NON	CHANCEL PORM	S CHELATING	CATAMENTUIAL OR CO	NTARIER TOTAL ACTIVITY	,	
DEMERATOR	(100 Table 1)	(៣3)	THOLEN			BEIA.			BTARLALA FICH	CHELATING ADENT	A3687	Nea AL			PCARTO
HAMINE R			(kg)	are (pushes	40	D.A. make	(true rando 2)	(m3)	ME CAA 16-00 WHE TI			Nuclide	the second se	mCi	C CLASS
TO-CT-E-14-195	4	0.212		20	<3.67E-6	<3.67E-5	39	0.212	100	Oxide/NP	NP	Re-228	5.51E+00	1 49E-01	NA
1347			125									Peckage total	5.51E+00	1.49E-01	
TO 07 5 44 400		0.010		40	10.075.0	<3.67E-5	- 39	0.212	100	Oxide/NP	NP	Ra-226	7.36E+00	1.48E-01	
TO-CT-E-14-196 1347	4	0.212	142	40	<3.67E-6	<3.07E-5	38	0.212	100	Oxide/INP	NF	14-220	V.30E+00	I ANE-01	
			1.10		1							Package total	7.38E+00	1.998-01	
TO-CT-E-14-197 1347	4	0.212	52	7	<3.67E-6	<3.87E-5	39	0.212	100	Oxide/NP	NP	Ra-226	7,40E-01	2 00E-02	: NA
			-					1				Package total	7.40E-01	2.00E-02	Ē
TO-CT-E-14-198 1347	4	0.212	F a	0.2	<3.67E-6	<3.67E-5	39	0.212	100	Oxido/NF	NP	Ra-228	3.66E-01	9 90E-03	NA
			50		1		1			· ·					-
And the supervised states and the supervised states and the supervised states and the supervised states and the												Package total		9.90E-0	
TO-CT-E-14-199 1347	4	0.212	54	0.4	<3 67E-U	<3.67E-5	39	0.212	100	Oxide/NP	NP	Re-226	7.40E-01	2 00E-0	
			-									Package total	7.40E-01	2.00E-0	2
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	Re-228	1.84E+00	4 07E-0	2 NA
												Package tota	1.84E+00	4.97E-0	2
									-						

INTE 1 Container Description Come For contain			1940 X Fre w distribution or wells that must despend and which has a stably responses to the manifest matter well be between by "4."							
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the manufactal code must be followed by "OP"		28 Martinese Auto	No Calles and East upger Monter	· Martin Brailing						
1 Manhot Bas - Crite	· Derservier	a 🖬	31. Artean fan Einstearige Medit	M Compatibul Last	Two Stran				Destal to allow	
T Marine Barry	10 time Cylinder	2 3 Came	13 Maast Dat to Failways Made	an time stagestate from	All Speeds Del	dit Preven	FL Carport Herbich	as one they're	String and a second of	1/10 Harms
1 Planta Court or Pal	11 B.C. Urgestingent Wester	1a 08	Al Conservation Engineerie	en Andread Carrents	11 Colders	#7 Finne A	74 Manuard	to been 13 of	St. Concepts IF improductors	Contract of the local division of the local
s Martin Davis of Page	12 Virgenbager Simmer to the	Ph. Agentus Janit	M Crystel Statel (Correl Cd)	All Redrigent Metanol (16 with Journal Co	ta Filler Digit		75. Parent I	additional jumps	47 Bauman	
P, Malan Tara ar Linur	13 Mart Stage By Consultant	in the lasts	M. Talaansa oo ji sharara	Canana	C.petro	88 Cramel 30	12 Agament		62 Viryi Digartan	
Company Tart of Land	18 Citer desides of Barn B.	16 Million and Pillion	26. Reality Distance Lineared	43 Auto-Red Victorial	A3 14 DM	70 Created 80	77 Augusta 6		the Verys False Careros	
· Palpadadara Tank ar Lina	takili		S7 Public Public	Stationary Concerning on Name 11 or	14 Bate 1-Dorb	F1 Crownal 3030			Mi Salua - Linneston de Darie 13	
St. Filmerground Fields of Libert		Material		Later a Page	AT Bala H Dri	P3 (Suspen HP3R)			-s falditional Page	

IRC FORM 541A							, ,			UG NUCLEAR REQU	LATONY COMMI	28011	2 MANIFEST	NUMBER	
					WASTE	EVEL RADI MANIFEST VASTE DESCI) PAGE_2_OF	TO-2014- 2_PAGE(6)	
	niseo	SAL CONT	AINER DESC	RIPTION					MARTE DESCOU	DION COR FAC	MWASTE T	PE IN CONTAINE	ρ		T
S CONTAINER	1			B BURRACE		IN ACE	[2]	ITEKCAL DESCH		IN CHEMICAL	COLUMN TWO IS NOT THE OWNER.		LOGICAL DEOCREP		
DENTIFICATION HAMBER GENERATON	GUNTACULI DE COMPTION - { Trus Parls 1)	vocume (m3)	TABLE AND CONTAINER WEIGHT	RADIATION LEVEL	CONTA	Hanita Tacina Galanga Galanga Galanga	II WARTE	13 Appinnouto miliit y/21 tatim ay1122749438	13 BORBENT BOLIDIFCATION BTABELIATION	CHEMICAL FORM	WEIDEE N CIELATRO ADENT	HERVERIAL RAKHALCEICE CONTAINS & TOTAL OR E	S AND ACTIVITY (MON	AND MIN	1
MANDER			(kg)	m Della	ALPHA	ONLINA	(bas fests 2)	<u>(m3)</u>	MEDIA (time home 3)		8+Q1%	Nucide	MBq	mCi	
10-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		
TO-CT-E-14-202	4	0.212			<3.67E-6	<3.67E-5	- 39	0.212	100	Oxide/NP	NP	Package total Ra-226	3.06E-01		
1347	•		63									Package total			
TO-CT-E-14-203	4	0.212		13	<3.87E-8	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	1 10E+01		
1347			54,5									Package total	1 105-01	2.98E-01	
10-CT-E-14-204	4	0.212	1000	6	<3.67E-8	<3.67E-5	39	0.212	100	Oxide/NP	NP	Ra-226	3.68E-01		
1347	-		595												
		<u> </u>								-		Package lotal	3.66E-01	9,90E-0;	3
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		U & NUCLEAN PEQULATO	RY COMMISION	1	WASTECOLECTO	WHOCEGO	X			2 MANTEST HUNDEN	
6-1 996)	, i	JNIFORM LOW-LEVEL RADIOACTIN		HAJAE	onmental Gro			SIMPITEN (JOE CH	LT	TO-2014	-105
		NIFEST INCEX AND REGIONAL COMPACT TABULI		T-KY003-L14	l						
·····		riginal "PROCESSED WASTE" before "COLLECTED		4/23/2014						PAGE_1_OF_1_PAGE(S)	
		3	đ)	9	1	9	10	11	AS PROCESSED	OLLECTED TOTAL	
	RATOR	GENERATOR NAME	DENERATOR	MIPHOCIEMED	Marate al of Parts	WASIE	faalle vonaste vie t				
	CATION	PERMIT NJIMECR	FACETY	BIRAN		CODE	n, darnis f	A BOUNCE	D. CNM	C. ACTIMITY	D VOLIME
HLM.	NBCH	AND TELEPHONE NUMBER	ADDIKEDO	(JARIN BEEAM INC)	ا مدينة 17 مليكة (1 - 10 مالية والد ي		1 11	MATERIAL			
				VILLAN	-		4184 -			(MBq)	(m3)
				F CAB	(1) 942 (FF)			(kg)	(0)		
13	347	CT DEEP/New England Air Museun	38 Perimoter Rd. Windsor Locks, CT 06096	2.120	NĂ	С	ст	0.00E+00	NP	2.91E+01	2.120
		860-623-3305							. <u></u>		
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		J	TOTALS OF ALL PAGES INITE FO	RINS 542 AND (1 14ZA)	1	<u> </u>	0.000	0.000	2.91E+01	2.120

				GICAL SURVEY FO			
Location	n: NEAM		Purpose: Dr	um #1 Survey - Pr.	ior to Ship	ment to Smi	thsimian
Smear Number Interior	DPM/100 CM ² α 8	DPM/100 CM ² β ND			<u>2</u> 1 m.		
Top Lid	8	36		Ť			
Exterior	4	50					
			.14			1 m. . <u>14</u>	
Commen	ts:		Instrumentation	Key O=Smear Location, Do	se Rate = $mR/hr \gamma$ "X"	= Fixed (CCPM/DPM)a	/β
Common			Make: Ludlum	Model: 3030P	Serial #: 26689	Cal Due: 09/09/14	QA Check: SAT
			Make: Ludium	Model: 14C	Serial #: 128973	Cal Due: 10/15/14	Source Check: SAT
			Make:	Model:	Serial #:	Cal Due:	QA Check:
				Performed By D. Strick	and		: 06/26/2014
Backgrou	and (s) $ND \leq H$	Background =	β 160 DPM α 0 DPM	Reviewed By M.E.	finte	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

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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 1.49 MBq

			RADIOLO	OGICAL SURVEY FC	RM		
Locatior	n: NEAM		Purpose: I	Drum #2 Survey - Pres	- to Shinne	to Smithso	بالم (أحد لم
Smear Number	$\frac{DPM/100}{CM^2 \alpha}$	DPM/100 CM ² β					
Interior	12	9		<u>.0</u>	<u>3</u> 1m.		
Top Lid	8	109		T			
Exterior	8	64					
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Commen	ts:		Instrumentation	Key O=Smear Location, Do			
			Make: Ludlum Make: Ludlum	Model: 3030P Model: 14C	Serial #: 26689 Serial #: 128973	Cal Due: 09/09/14 Cal Due: 10/15/14	QA Check: SAT Source Check: SAT
			Make: Ludium	Model: 14C	Serial #: 128973	Cal Due: 10/15/14	QA Check: SA1
			IVIANC.	Performed By D. Stric			06/26/2014
Backgrou	(s) ND < F	Rackground =	β 160 DPM α 0 DPM	Reviewed By M-2.	1 in a		7/22/14

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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

				GICAL SURVEY FO			
Location	n: NEAM		Purpose: Dr	um #3 Survey - Price	to Shinme	at to Smith	hsoniah
Locatior Smear Number Interior Top Lid Exterior	h: NEAM DPM/100 $CM^2 \alpha$ 4 4 4 	DPM/100 CM ² β ND 136		<u>SicAL SURVET PO</u> um #3 Survey - P _{r√e} .03	<u>x to Shipme</u> <u>3</u> 1 m.	nt te Smith	-Soutia μ
			. <u>.03</u>	1 m. 3	<u>)</u> <u>.08</u>	1 m. .03	
Commen	ts:		Instrumentation Make: Ludlum	Key O=Smear Location, Dos 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. Stric	kland	Date	: 06/26/2014
Backgrou	(s) ND < F	Background =	β 160 DPM α 0 DPM	Reviewed By W-E.		Date	7/22/14

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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

			RADIOLOG	GICAL SURVEY FO	RM				
Location	n: NEAM		Purpose: Dr	um #4 Survey _ P	in to Shin	et to S	mill ea	in the c	
Location Smear Number Interior Top Lid Exterior	h: NEAM DPM/100 CM ² α 8 ND 4	DPM/100 CM ² β 41 55 ND	RADIOLOC Purpose: Dri	JICAL SURVEY FO um #4 Survey - Pro	1 m.	rent to Si	nithse		
			<u>.14</u>	<u>1 m.</u> (3 <u>1.5</u> 1	.7	1 m. 			
Comment	ts:		Instrumentation	Key O=Smear Location, Dos					
			Make: Ludlum	Model: 3030P	Serial #: 26689	Cal Due: 09/		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								
Backgrou	and (s) $ND \leq B$	ackground =	β 160 DPM α 0 DPM	Reviewed By M.E.	fuilt		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	52 Bank Climb Gyro Control, For MARK 4 Automatic Pilot, PART# 656403, cont a(s) 2905, Electric Auto-Lile Co under License from Sperry		.2
4	264	Angle of Attack Indicator, USNBU. AERO Special Devices Div Device RF-6, Type NO 10082-10B-2-A2, Bendix/Eclipse/Pioneer		.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	294 Turn + Bank (Japanese), Navy Model 2, Tokyo Koku ? Not sure right tag , Keiki KK.				
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, Milliers 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		

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4	412	Bombsight? PolarGrid on see through 2, needles nahe F309 AEG Ln27002, W 47154		.025
4	413	Air Speed? 0-300 HandmadeDial, Kollsman (whttag A-68)	5	.005
4	428	428 Speedometer 0-250 Km/st, Zeiger Regulierling, UtenamApparat No 10249, Luftstrommesser Bruhn, Berlin W. Mauerstr 86-88		.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

Total

MBq

42.38

July 24, 2014

BILL OF LADING - SHOR - NOT NEGOTIABLE

July 24, 2014 BILL OF LADING – SHO	RZ-ORM - NOT NEGOTIABLE	Page 1 of 1
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	PRO. # 947-518321-X	
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		
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		
6 th & Independence Avenue, SW		
Room 33112 Attention: Ms Collette Williams		
Washington, DC 20560-0312		
Special Instructions: GOVERNMENT TENDER G3020		

CARRIER INFORMATION

	Package						
	Qty	Туре	Weight	НМ (Х)	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 V		Weight	нм (х)	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	
	Annes Arrist	and a subscript of the second s			Ra-226, Solid Metal Oxides, 0.08 MBq's (0.0022 millicuries)	
en en general en					Radioactive White I, Seal Number: 0959943	
	Qty	Туре	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
 ik. Liilin (-			

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:	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.

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ATTACHMENT 3

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Device Inventory

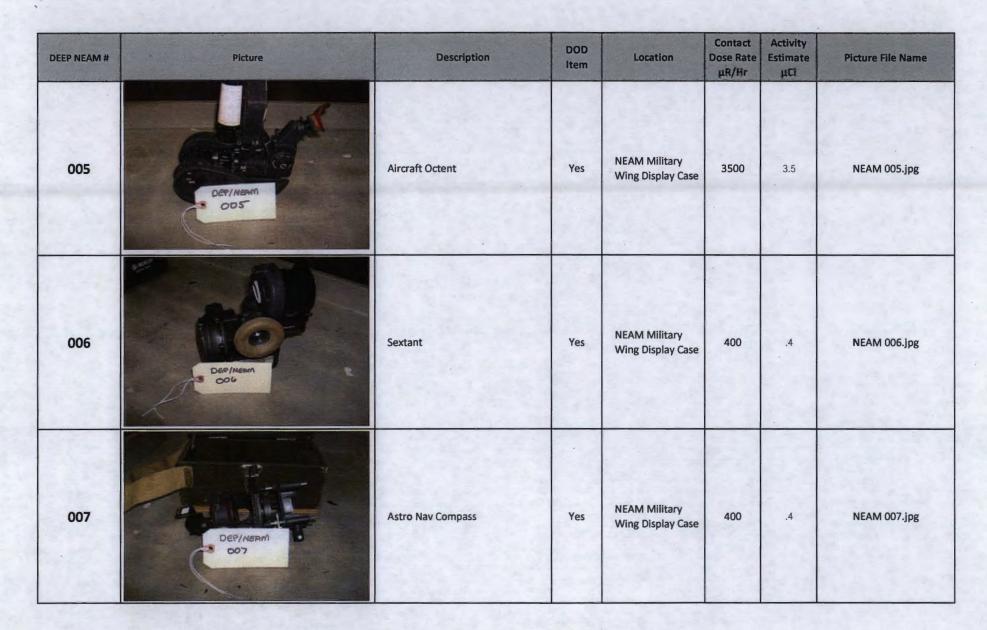




DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
001	Dest/main Col	Nordin Bombsight	Yes	NEAM Front Lobby	7	.007	NEAM 001.jpg
002	DEP/NEAM DEP/NEAM DD2	O2 Tank	Yes	NEAM Flying Tigers Room On Top of Hell's Angel Shelf	50	.05	NEAM 002.jpg
003	CK97.WRMM Dr03 Dr03	Bombsight (Circa 1920)	Yes	NEAM Military Wing Display Case	120	.12	NEAM 003.jpg

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Page 2







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





DEEP NEAM #	Picture	Description	DOD ltem	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	DEVACAM OH OH OH OH OH OH	Radio Compass with Link Flying Trainer Type ANT-18	Yes	Storage Hangar	100	.1	NEAM 014.jpg
017	Destration Or O	O2 Register - Serial AF44-25493	Yes	Storage	10	.01	NEAM 017.jpg



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DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
021	Der/nean oai	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

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

NEAM Radium Gauge Log Final.xisx



DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCl	Picture File Name
035	DÉT/HEAM 035	Oxygen Cylinder Pressure Gauge	Yes	Flying Tigers Room	1500	1.5	NEAM 035.jpg
036	Det/Actin O24	Blinker O2 Flow Indicator	Yes	Flying Tigers Room	2000	2.	NEAM 036.jpg
037	DEQUAREAR DECAMERAR	P-40 Fuel Indicator	Yes	Flying Tigers Room	1000	1.	NEAM 037.jpg



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DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
038	DEDYNEAM DAT	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

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

6/20/2017



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

6/20/2017





DEEP NEAM #	Picture	Description	DOD ltem	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
080	NEAM-DEEP #80	Amps/Volts Model 506		Storage	800	.8	NEAM 080.jpg
088	NEAM-DEEP TO THE	Altitude Pioneer, Type 1528-2E-8		Storage	1400	1.4	NEAM 088.jpg
097	NEAM-DEEP #97	Multi Gauge, General Electric, Fuel, Main L H, Main R H		Storage	700	.7	NEAM 097.jpg

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DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
112	NERM-DEEP 7/2	Height, Zenith 1533USA		NEAM Sealand Container	170	.17	NEAM 112.jpg
118	DEP //warer 1/8	Astr Compass MKII (with case), W.W. Boes Co.		NEAM Sealand Container	200	.2	NEAM 118.jpg
119	DEP/NERM 119	Fuel/Air Ratio, Cambridge Instrument co., A.C. US Army, Type B-6	Yes	NEAM Sealand Container	250	.25	NEAM 119.jpg

6/20/2017





DEEP NEAM #	Picture	Description	DOD item	Location	Contact Dose Rate µR/Hr	Activity Estimate μCi	Picture File Name
125	Der/Mahn 125	Flight Indicator, Pioneer Instrument Company, Bank + Pitch, Part 07409, A.C USARMY Type A-4	Yes	Storage	800	.8	NEAM 125.jpg
151	DEPARTING STATES	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	Bepkenn 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 µC	Picture File Name
154	a DEP/ARMM 15H	Indicator Oil Quantity, EA48-16, MFRS Part EA-48-16, Contract AC- 19673, The Liquid Meter Corp.		Storage	30	.03	NEAM 154.jpg
157	DEMALERAM 15	Clock-Waltham, FSS#88 C 590, Part #CDIA, US NAVY	Yes	Storage	50	.05	NEAM 157.jpg
187	DEPINEAM 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	DEP/NERM 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	DEP/NERM 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	Confinence 236	Aircraft Automatic Pilot, Type A-3A JH 6000, Bank Climb Gyro JH6110		Storage	500	.5	NEAM 236.jpg

Contact Activity DOD DEEP NEAM # Picture Description Location Dose Rate Estimate **Picture File Name** Item uR/Hr μCi Hydraulic Pressure Gauge, US 254 Gauge Company, Part AW 17/817 NEAM 254.jpg Storage 100 .1 AV DEPINERM Control bank and Climb, Type3A Aircraft Automatic Pilot, Air 308 Yes Storage 1100 1.1 NEAM 308.jpg Forces United State Army, W33-038-AC4341, Jack+Heintz Inc. erhorm 308 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 332 Storage 5000 5. NEAM 332.jpg 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,

P.g. 16



Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
DEET/NEAR 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
Intecal BEEPTINEAR 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
DEEP/NEAM 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

6/20/2017

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DEEP NEAM #

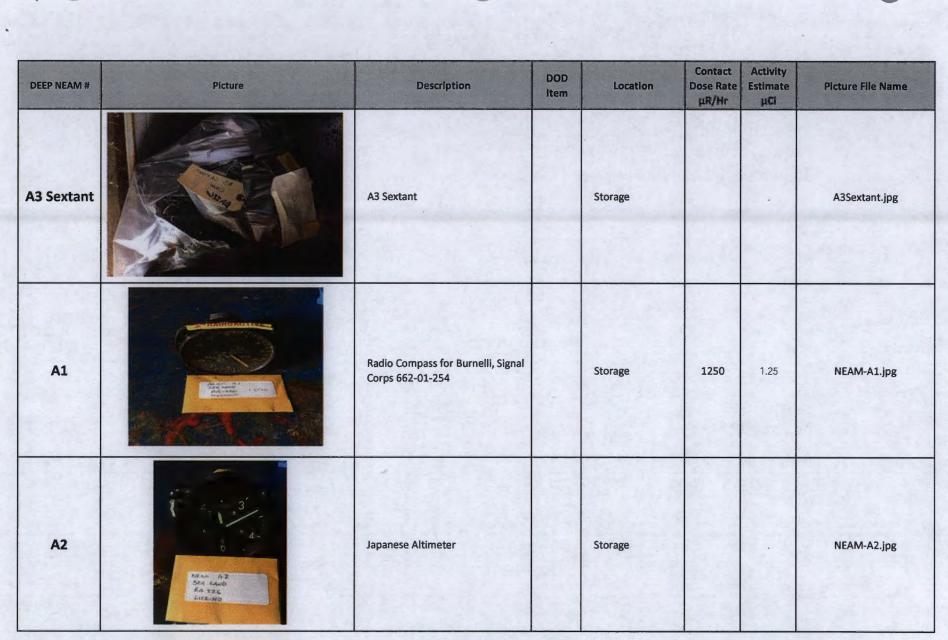
360

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DEEP NEAM #	Picture	Description	DOD item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
408	DEEP NERM 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	DEEP NERT 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	DEEP NEAM OC 43 7	3 Gauge Assemble, Directional Gyro, Gryo Horizon, InHg, whitetag D142		Storage	1200	1.2	NEAM 437.jpg



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DEEP NEAM #	Picture	Description	DOD Item	Location	Contact Dose Rate µR/Hr	Activity Estimate µCi	Picture File Name
A3	A THE MAN	Japanese Bank Climb		Storage			NEAM-A3.jpg
Α4		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

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UNITED STATES NUCLEAR REGULATORY COMMISSION REGION I 2100 BENAISSANCE BOUILEVARD SUITE 100

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

B. Baffer

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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 <u>http://www.nrc.gov/reading-rm/adams.html</u>. 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,

Blik Mil

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

B. Baffer

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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:

- 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

DISTRIBUTION: ADAMS (PARS) J Peralta, OE N Hasan, OE S Rodriguez, OE M Burgess, NMSS R Sun, NMSS S Holiday, NMSS

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J Trapp, R1 J Nick, R1 B Welling, R1 T Jackson, R1 B Klukan, R1 M McLaughlin, R1 C Crisden, R1 B Bickett, R1 D Janda, R1 M Ford, R1 L Sreenivas, OE R Erickson, RIV K Wagner, NMSS D Bearde, R1

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NAME	TJackson		MMcLaughlin	BWelling /
DATE	5/3/11		514/17	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

Notice of Violation United States Coast Guard

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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 Sth day of May 2017

2

U.S. NUCLEAR REGULATORY COMMISSION REGION I

INSPECTION REPORT

Inspection No.

99990001/2015001

Docket No. 99990001

License No. General License

EA-17-037

Licensee:

EA No.

Location:

Inspection Dates:

Inspectors:

May 26, 2015, through April 26, 2017

Department of Homeland Security 2703 Martin Luther King Jr. Avenue, SE

Washington, DC 20593-7000

Headquarters, United States Coast Guard

United States Coast Guard

May 8, 2017

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

Approved By:

Blal Mh

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 <u>www.helis.com</u> 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:

	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

Maximum number of IBIS devices installed in US Coast Guard Helicopters

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.

	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

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

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

B. Baffer

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,

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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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United States Coast Guard Washington, DC

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Notice of Violation United States Coast Guard

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Dated this standard day of May 2017

2

U.S. NUCLEAR REGULATORY COMMISSION REGION I

INSPECTION REPORT

Inspection No.

99990001/2015001

EA-17-037

Docket No. 99990001

License No. General License

EA No.

Licensee:

Location:

Inspectors:

Inspection Dates:

May 26, 2015, through April 26, 2017

Department of Homeland Security 2703 Martin Luther King Jr. Avenue, SE

Washington, DC 20593-7000

Headquarters, United States Coast Guard

United States Coast Guard

May 8, 2017

Todd Jackson D 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

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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 <u>www.helis.com</u> 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:

	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

Maximum number of IBIS devices installed in US Coast Guard Helicopters

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.

	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

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

c. <u>Conclusions</u>

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

B. Baffer

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 <u>http://www.nrc.gov/reading-rm/adams.html</u>. 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,

Black Mill

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

B. Baffer

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Docket No	. 99990001							
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1. Notice	of Violation							
2. Inspect	ion Report 999900	001/201	5001					
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DATE	5/3/11		514/17		5/8/17			

OFFICIAL RECORD COPY

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

Notice of Violation United States Coast Guard 2

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 <u>5-M</u> day of <u>May</u> 2017

U.S. NUCLEAR REGULATORY COMMISSION REGION I

INSPECTION REPORT

Inspection No.

99990001/2015001

EA-17-037

Docket No. 99990001

License No. General License

EA No.

Licensee:

Location:

Inspectors:

Inspection Dates:

100 free

United States Coast Guard

May 8, 2017

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

Headquarters, United States Coast Guard

Department of Homeland Security 2703 Martin Luther King Jr. Avenue, SE

May 26, 2015, through April 26, 2017

Washington, DC 20593-7000

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.

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b. Observations and Findings

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

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

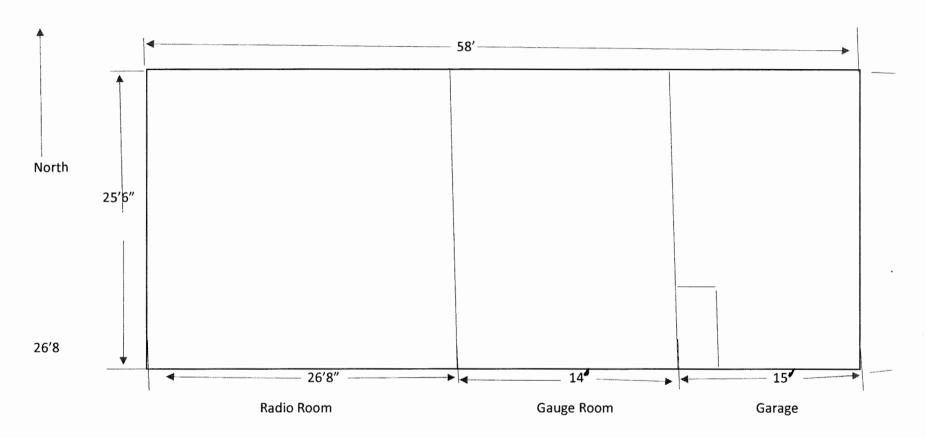
ATTACHMENT 5

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Nega -

States -

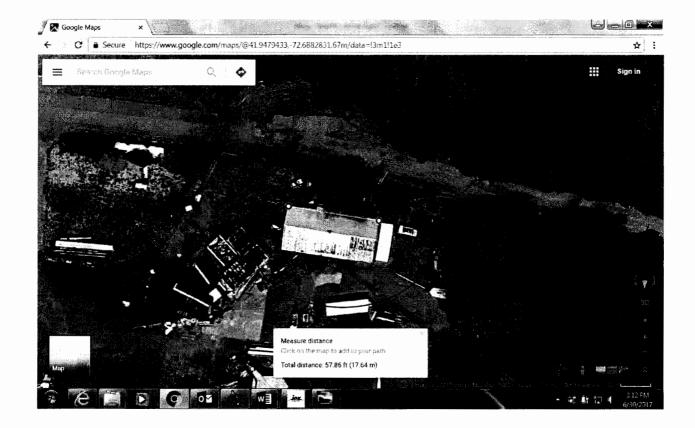
Gauge Building Schematic and Photographs



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

 $\frac{1}{2}$

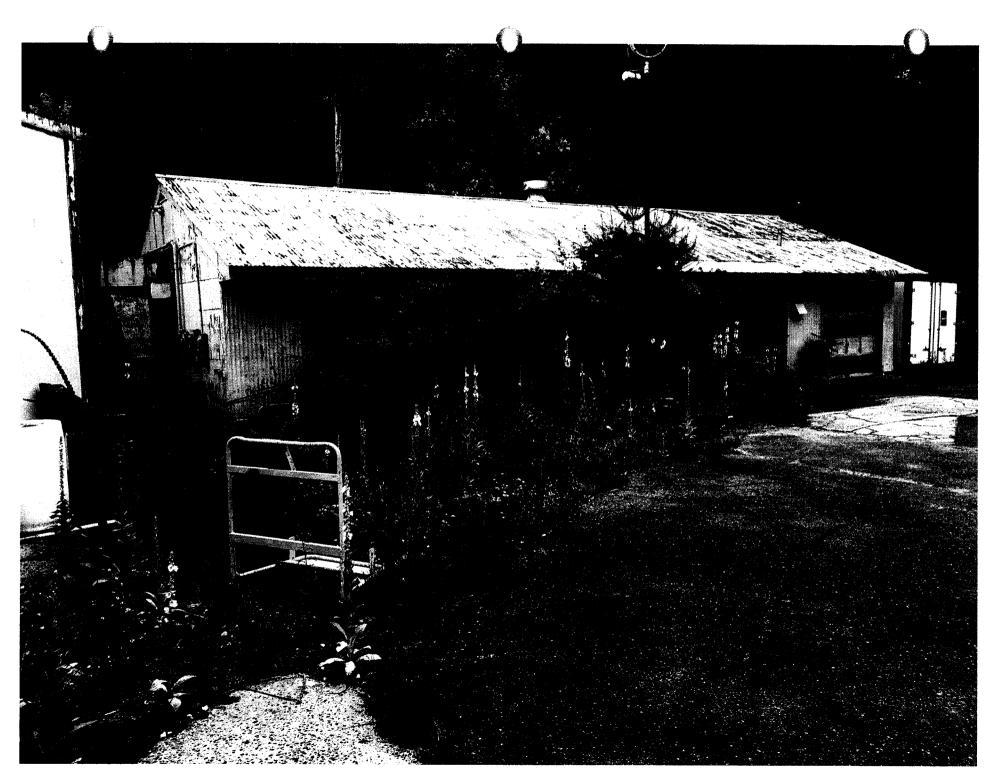
1

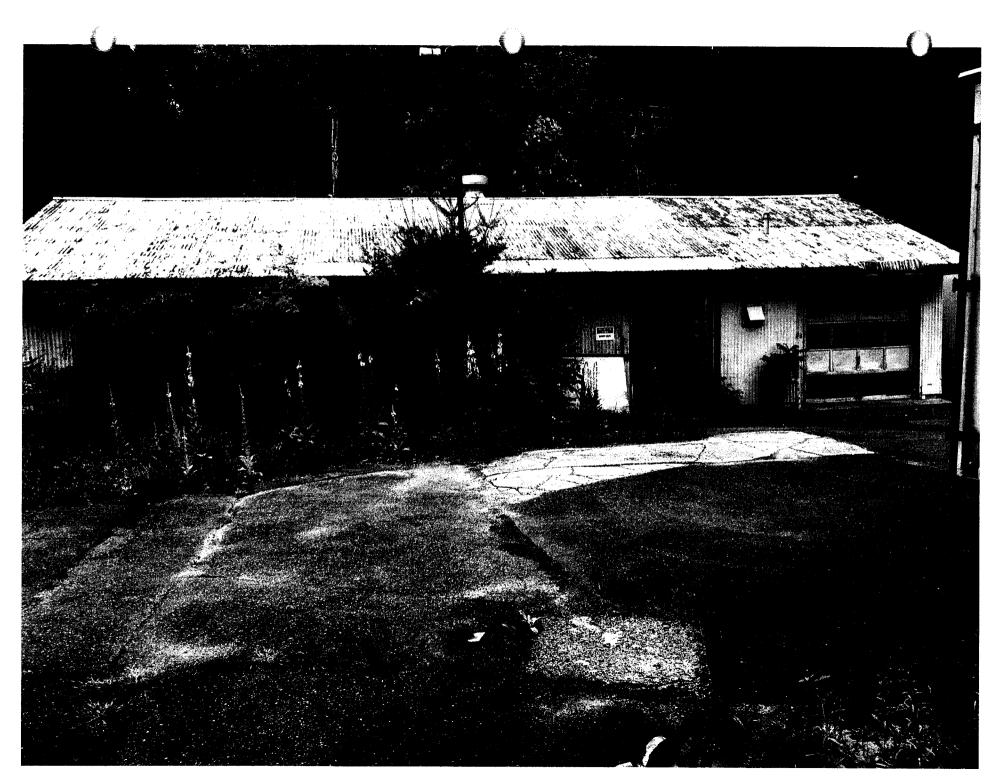


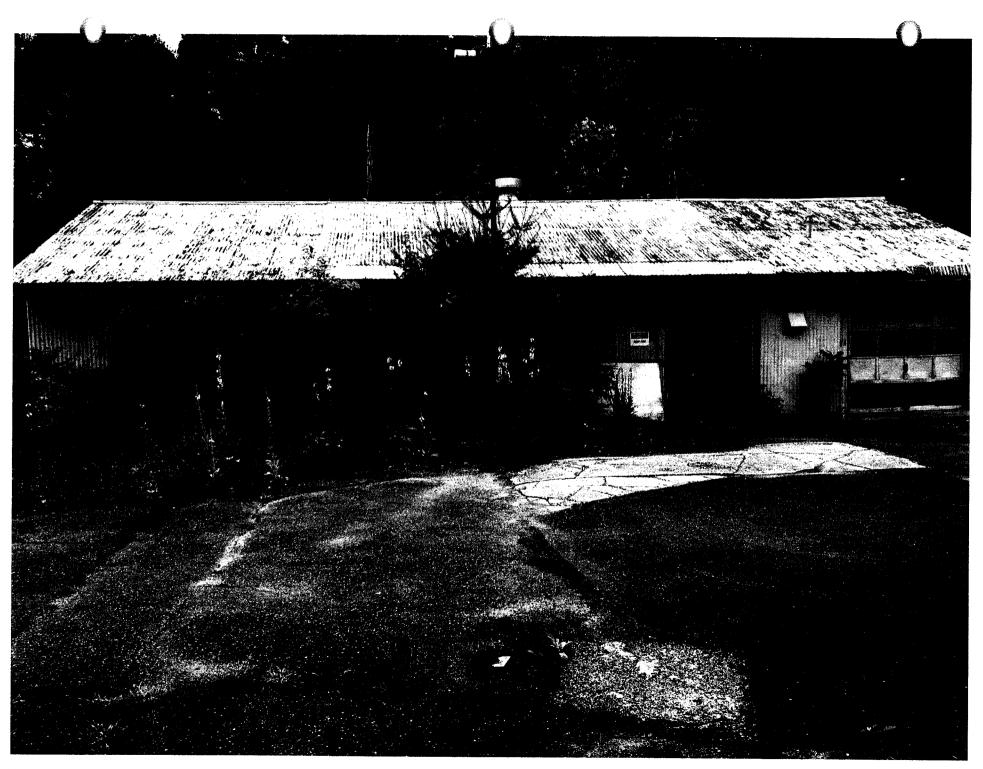
New England Air Museum (NEAM) Aerial View of Garage Building

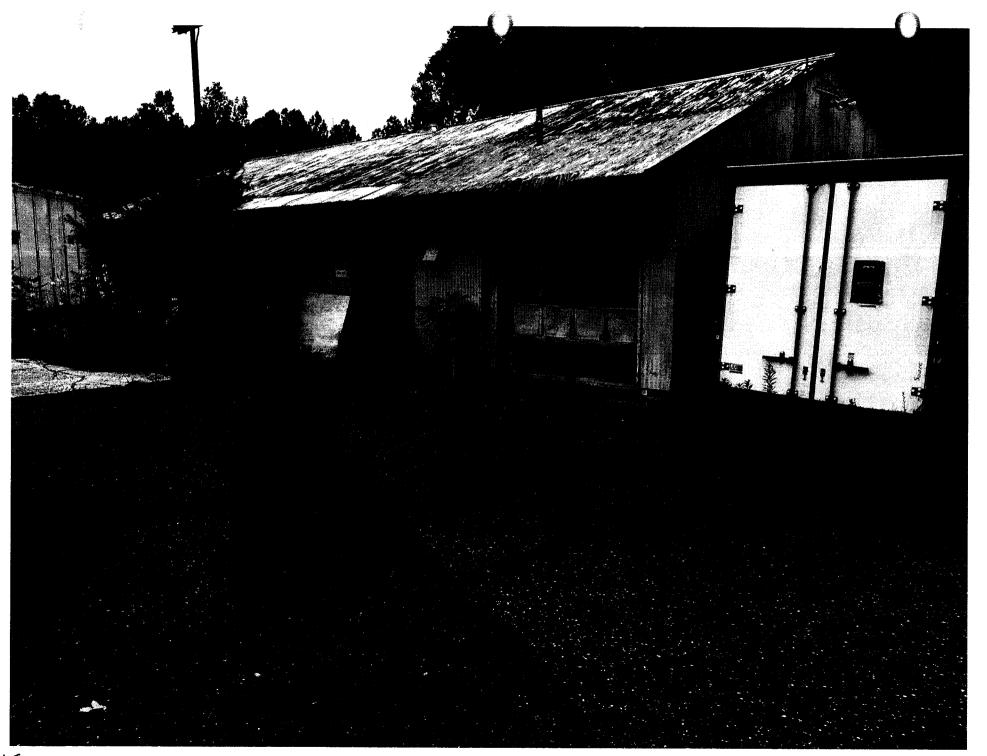




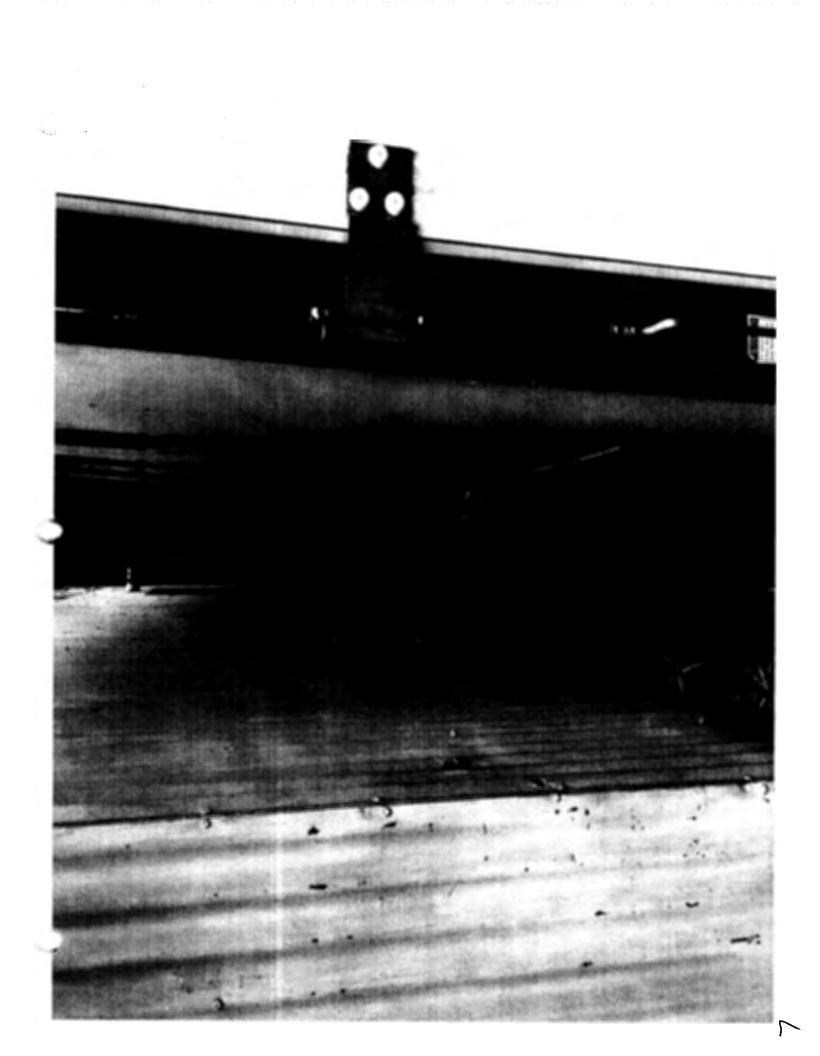












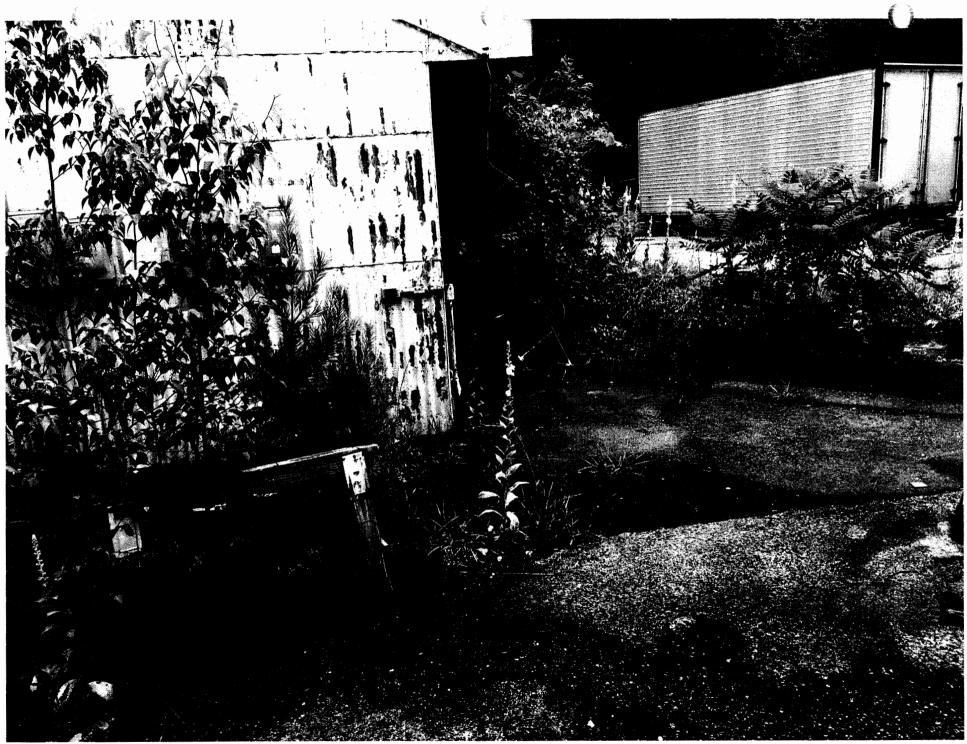






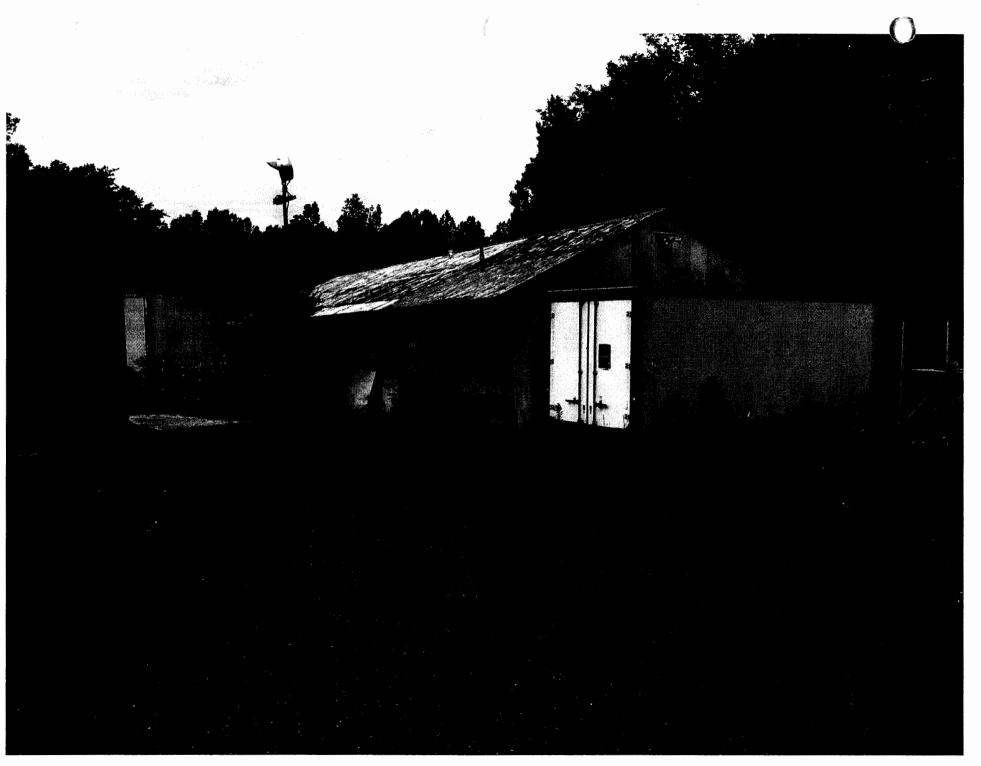












ATTACHMENT 6

Survey Results – Area Surrounding Gauge Building

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WSay - -

	<u></u>		RADIO	DLOGICAL SURVEY	Y FORM		,,,,
Location	n:NEAM Exte	erior Aircra	ft Douglas A3 Purpose:	Final Status Survey	- Smears		
Smear Number	DPM/100 CM ² α	DPM/100 CM ² β		Cock	pit Area		
1	2	ND					
2	ND	18					
3	ND	ND					
4	ND	ND					
5	ND	18					
				5 Radio C.B.	3		
Comment	ts:		Instrumentation	Key O=Smear Location	n		
	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 %	6 / β22.4 %		Make:	Model:	Serial #:	Cal Due:	QA Check:
"ND" = "	Non Detect" <=	Background	Radiation = α .6 CPM / β 42 C		Vac	Date:	8/27/14
				Reviewed By WC	ille E. Joil	/ Date:	82914

				GICAL SURVEY FO			· ·
Locatior	n:NEAM Exte	rior Aircra	ft Gruman E1B Purpose: Fi	nal Status Survey - Sn	nears		
Smear Number	DPM/100 CM ² α	DPM/100 CM ² β					
6	ND	ND					
7	ND	ND					
←							
			Emergency Escape Hatc	h Front	ſ	Emergency Escape Hat	ch Front
				6			
						•	
			-		L		
/			-				
\neq			-				
\square							
Comment			Instrumentation	Key O=Smear Location			
	4.24 DPM / β 1	8.02 DPM	Make: Ludlum	Model: 3030P	Serial #: 266689	Cal Due: 09/09/14	QA Check: Sat
Efficiency			Make:	Model:	Serial #:	Cal Due:	QA Check:
<u>a 26.5 %</u>	δ / β 22.4 %	Dealer 1	Make: Radiation = α .6 CPM / β 42 CPM	Model: Performed By Reviewed By	Serial #:	Cal Due:	QA Check:
3 TT5 44 //3		Hookground	$V_{P} = \alpha - 6 \Gamma V M / B A T \Gamma V M$	L Hortormod UV	4T)	/ Notos	

	ý.			ца Ца ца				
	``a.		RADIOLO	GICAL SURVEY FO	ORM	<u>-</u>		
Locatio	n:NEAM Exte	erior Aircra	ft RB-57A Canberra Purpose:					
Smear	DPM/100	DPM/100						
Number	$CM^2 \alpha$	$CM^2 \beta$						
8	ND	ND						
<u> </u>								
		/	-					
		/	-					
		/	-					
		↓ /	4	ADF Rece	eiver			
				r				
		1			8			
		/		L				
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	<i> </i> -		-					
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	+/							
	-/							
	/		-					
/	/							
\neg								
1								
+								
Commen	ts.	→	Instrumentation	Key O=Smear Location				
	14.24 DPM / β1	8 02 DPM	Make: Ludium	Model: 3030P	Serial #: 266689	Cal Due: 09/0	9/14	QA Check: Sat
Efficienc		0.02 D1 11	Make:	Model:	Serial #:	Cal Due:		QA Check:
a 26.50	% / β22.4 %		Make:	Model:	Serial #:	Cal Due:		QA Check:
u 20.0 /				1	1			
$\frac{u^2 20.5^2}{"ND"} = "$	"Non Detect" < =	Background	Radiation = α .6 CPM / β 42 CPM	Performed By	<u></u>	1	Date:	8/27/14

					BICAL SURVEY			
			ft C-7A Caribou	Purpose: Fina	al Status Survey - S	Smears		
Smear	DPM/100	DPM/100						
Number	$CM^2 \alpha$	CM ² β						
9	ND	13						
		—						
			-					
		+ /	-					
			-					
			_					
		/						
		X					\sim	
							9	
		_	1					
						ADF Receiver on Cor	isole	
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/			-					
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Comment			Instrumentation		Key O=Smear Location			
$ADA \cdot \alpha 1$	4.24 DPM / β	18 02 DPM	Make: Ludlum		Model: 3030P	Serial #: 266689	Cal Due: 09/09/1	4 QA Check: Sat
Efficiency		10.02 DI WI	Make:		Model: Model:	Serial #:	Cal Due:	QA Check:
	/β22.4%		Make:		Model:	Serial #:	Cal Due:	QA Check:
<u>» الماني الم</u>	Non Detect" $< =$	Background	Radiation = α .6 CI	M / β 42 CPM	Performed By	8		ate: 8/27/14
		0.0.114			Reviewed By	n ol a		vate: 8 28 14

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	RADIOLOGICAL SURVEY FORM								
Location	NEAM Exte	rior Aircraf	t HU-16 Albatr	oss Purpose: Fi	nal Status Survey - S	Smears			
Smear	DPM/100	DPM/100		'					
Number	$CM^2 \alpha$	$CM^2 \beta$							
10	ND	ND				$\sim \sim$	\frown		
11	ND	ND				2))()()	()		
12	ND	ND					$\widetilde{}$		
13	5	4		$\neg \cap \cap$	$() \cap [$	$) \cap$	$\cap \cap$	$\square \square$	
	2	ND			$\bigcirc \bigcirc \bigcirc \square$	\square	\cup \cup		
14	ND	ND	1 0		\cap	$\overline{\frown}\overline{\frown}$	\cap \cap	$\sim \sim$	
15	ND					$\mathcal{O}\mathcal{O}(0)$	()		
		<u> </u>			0 0		0 0	$\mathbf{\circ}$	
				Cockpit Console					
						(14)			
						<u> </u>			
	/								
	/			\bigcirc					
				\mathcal{O}					
					\backslash				
				(15)	Pilot Side O2 Regulate	or			
	/								
							Rudder Boo	st Upper Side	
-/									
Comment		9.02 DDM	Instrumentation		Key O=Smear Location Model: 3030P	Serial #: 266689	Cal Due: 09/09/14	QA Check: Sat	
	4.24 DPM / β 1	8.02 DPM	Make: Ludlum Make:		Model: 3030P	Serial #: 266689	Cal Due: 09/09/14	QA Check: Sat	
Efficiency	^γ : δ / β 22.4 %		Make:		Model:	Serial #:	Cal Due:	QA Check:	
		Background		CPM / β 42 CPM	Performed By	19	Date	the second se	Ч
			with a lo		Reviewed By	DE. Jack		8 agirt	1

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·······		OGICAL SURVEY FORM			
Location:NEAM Exterior Ai		Sinal Status Survey - Smears			
Smear DPM/100 DPM					
Number $CM^2 \alpha$ CM^2	3				
16 ND NI)				
	7	Cockpit Area			
	/				
		16			
/					
/					
/					
	→				
omments:	Instrumentation	Key O=Smear Location			
1DA: α 14.24 DPM / β 18.02 DF		Model: 3030P Serial #: 266689		09/09/14	QA Check: Sat
fficiency:	Make:	Model: Serial #:	Cal Due:		QA Check:
<u>26.5 % / β22.4 %</u>		Model: Serial #:	Cal Due:	D	QA Check:
ND" = "Non Detect" < = Backgro	bund Radiation = α .6 CPM / β 42 CPM	A Performed By Reviewed By M P. DE. Juil	1	Date: Date:	8/27/14
		- Reviewed Rules T T T		loto:	

strument	Ludlum 3030P		Serial #	26689	Cal Due:	9/9/20
robe	N/A	EFF % α 26.59		MDA α 13 dpm/1		
Location	Gross CPM (a)		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
	-					
omments:	-	"ND" < = Backg count time.	ground Radition	"BKG"; MDA calcula	ated for a 2 minu	ute sample

Sample Counting Form

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ATTACHMENT 7

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DandD Code Runs



5.b

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:

file:///S:/SHARE%20FILES/New%20England%20Air%20Museum/New%20England%20... 7/27/2017

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





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 concer	ntration: Ra226	<u>Value</u> 2.36E+00

Site Specific 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

- 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	Concentration	Area (m2)	Calculated	Notes
soil	(pCi/gm)		Annual TEDE	
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 <u>actual</u> 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	Concentration	Area (m2)	Calculated	Notes
soil	(pCi/gm)		Annual TEDE	
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 m². The table below indicates the dose results of the D&D Dose modeling code for 2 m², 4.6 m², 10 m², 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 m².

Contaminant in	Concentration	Area (m2)	Calculated	Notes
soil	(pCi/gm)		Annual TEDE	
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 concentra Ra-226 40 pCi/gm at 10 s		<u>Value</u> 4.00E+01

Site Specific 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 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 concentra pCi/gm, 10 sq meters.	ation: Ra-226 C, 40	<u>Value</u> 4.00E+01

Site Specific 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

Page 1 of 2

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 concent	ration: Ra226	Value 2.36E+00

Site Specific 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 concentra	ation: Ra-226+C	<u>Value</u> 2.36E+00

Site Specific Parameters:

General Parameters:

file:///S:/SHARE%20FILES/New%20England%20Air%20Museum/New%20England%20... 7/27/2017

None

Seco

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 concentra 2 sq meters.	ation: Initial 40 pCi/gm a	<u>Value</u> 4.00E+01

Site Specific Parameters:

Page 2 of 2

None

Element Dependant Parameters

None

Correlation Coefficients:

None

140.50

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

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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 concentra 4.6 sq meters.	ation: Initial 40 pCi/gm at	<u>Value</u> 4.00E+01

Site Specific Parameters:

General Parameters:

file:///S:/SHARE%20FILES/New%20England%20Air%20Museum/New%20England%20... 6/26/2017

None

Element Dependant Parameters

None

Correlation Coefficients:

None

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Summary Results:

90.00% of the 100 calculated TEDE values are $< 8.53 \pm +00$ mrem/year . The 95 % Confidence Interval for the 0.9 quantile value of TEDE is $8.53 \pm +00$ to $8.53 \pm +00$ 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 concen remediation results usir	tration: Highest post g actual remediated area.	Value 2.36E+00		

Site Specific Parameters:

None

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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 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 concentr	ation: Radium	Value 4.10E+00

Site Specific Parameters:

General Parameters:

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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 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 concentrati	on: Post Remediation	Value 2.36E+00

Chain Data:

Number of chains: 1

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

	Chain Position		Fractional Yield		~	 	Dose
						Rate	Rate

							Factor (Sv/Bq)	(Sv/Bq)	Factor ((Sv/d)/ (Bq/m ²))	((Sv/d)/
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		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	12 348-06 1	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:

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	

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Tf (2):Translocation:Poultry Forage	Translocation factor for forage consumed by poultry	CONSTANT(none)	
efault value used		Value 1.00E+00	
Tf(3):Translocation:Milk Cow	Translocatioin factor for forage consumed by milk cows	CONSTANT(none)	
Default value used	1	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	A	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	CONSTAN	T(none)
Default value used		Value	1.80E-01
an <u></u>	Mass fraction of milk that is carbon	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(none)
Default value used		<u>Value</u>	7.00E-02
fch(4):Layer Hen Hay Carbon Fraction	Mass fraction of wet stored hay consumed by layer hens that is carbon	CONSTAN	T(none)
Default value used		<u>Value</u>	7.00E-02
	Mass fraction of dry soil that is carbon	CONSTAN	T(none)

No.

 $\mathbb{V}_{0,i,i,j}$

Fraction	<u>I</u>	
Default value used		<u>Value 3.00E-02</u>
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		<u>Value</u> 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	-1 -	Value 1.00E+00
xw(1):Beef Water Contaminated Fraction	Fraction of water that is consumed by beef cattle that is contaminated	CONSTANT(none)
		Value 1.00E+00

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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	7	<u>Value</u> 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	J	<u>Value</u> 1.44E+01
Ua(1):Diet - Beef	Yearly human consumption of beef	
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	
Default value used		Value 2.33E+02
Ua(4):Diet - Egg	Yearly human consumption of eggs	
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	1	Value 3.65E+02
tcv(1):Consumption Period - Leafy	Food consumption period for leafy vegetables	CONSTANT(days)
Default value used	<u>.</u>	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)

	Value	3.65E+02
Food consumption period for beef	CONSTAN	IT(days)
Default value used		3.65E+02
Food consumption period for poultry	CONSTAN	IT(days)
	Value	3.65E+02
Food consumption period for milk	CONSTAN	IT(days)
	Value	3.65E+02
Food consumption period for eggs	CONSTAN	lT(days)
	Value	3.65E+02
Number of model layers used to represent the unsaturated zone	CONSTAN	IT(none)
	Value	1.00E+01
The start time of the scenario in days	CONSTAN	IT(days)
)(Value	0.00E+00
The ending time of the scenario in days	CONSTAN	-
14		3.65E+05
The time step size		
	Value	3.65E+02
The time steps for the history file. Doses will be written to the history file every n time steps	CONSTAN	IT(none)
	Value	1.00E+00
The time the resident spends indoors	CONSTAN	JT(days/year)
	Value	2.40E+02
	CONSTAN	(days/year)
	Value	4.02E+01
The time the resident spends gardening		VT(days/year)
1		2.92E+00
Total time in the one year exposure period	CONSTAN	JT(days/year)
)	Value	3.65E+02
Shielding factor for the residence	CONSTAN	
	Value	5.52E-01
Shielding factor for the cover soil	CONSTAN	VT(none)
	Value	1.00E+00
Floor dust loading	UNIFORM	l(g/m**2)
	Lower Lim	it 2.00E-02
	Food consumption period for beef Food consumption period for poultry Food consumption period for milk Food consumption period for eggs Number of model layers used to represent the unsaturated zone The start time of the scenario in days The ending time of the scenario in days The time step size The time step size The time steps for the history file. Doses will be written to the history file every n time steps The time the resident spends indoors The time the resident spends outdoors The time the resident spends Shielding factor for the residence Shielding factor for the cover soil	Yalue Food consumption period for poultry CONSTAN Value CONSTAN Food consumption period for milk CONSTAN Value Value Food consumption period for eggs CONSTAN Value Value Food consumption period for eggs CONSTAN Value Value Number of model layers used to represent the unsaturated zone Value The start time of the scenario in days CONSTAN Value CONSTAN The ending time of the scenario in days CONSTAN Value CONSTAN The time step size CONSTAN Value CONSTAN Value CONSTAN The time steps for the history file. CONSTAN Doses will be written to the history file every n time steps CONSTAN Value CONSTAN The time the resident spends outdoors CONSTAN Value CONSTAN The time the resident spends outdoors CONSTAN Value CONSTAN Shielding factor for the residence CONSTAN Shielding factor for the residence

RFR:Indoor Resuspension Factor	Resuspension factor for indoor dus		,
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 Upper Limit	1.00E-07 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 9.0	DOE-01
VX:Outdoor Breathing Rate	Breathing rate while outdoors	CONSTANT(m**	3/hr)
Default value used		Value 1.4	0E+00
VG:Gardening Breathin Rate	g Breathing rate while gardening	CONSTANT(m**	3/hr)
Default value used		Value 1.7	0E+00
GR:Soil Ingestion Transfer Rate	Average rate of soil ingestion	CONSTANT(g/d)	
Default value used		Value 5.0	00E-02
UW:Diet - Water	Drinking water ingestion rate	CONSTANT(L/d)	
Default value used			6E+00
H1:Surface Soil Thickness	Thickness of the surface soil layer	CONSTANT(m)	
Default value used		Value 1.5	50E-01
H2:Unsaturated Zone Thickness	Thickness of the unsaturated zone	CONTINUOUS LI	INEAR(m)
Default value used	<u>II</u>	Value	Probability
		3.05E-01	0.00E+00
		6.68E-01	4.76E-03
		8.11E-01 9.21E-01	9.52E-03 1.43E-02
		9.94E-01	1.43E-02 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 1.32E+00	4.76E-02 5.24E-02
		11.360.100	J.270-02

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 2.32E+00	1.24E-01 1.29E-01
	1.33E-01
2.36E+00	1.33E-01 1.38E-01
2.37E+00 2.39E+00	1.43E-01
	1.43E-01
2.44E+00 2.44E+00	1.52E-01
	1.57E-01
2.45E+00	1.62E-01
2.59E+00 2.63E+00	1.67E-01
2.63E+00 2.69E+00	1.67E-01 1.71E-01
	1.76E-01
2.79E+00 2.81E+00	1.81E-01
2.90E+00	1.86E-01
2.90E+00 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	2.10E-01
3.37E+00	<u>2.14E-01</u> 2.19E-01
3.44E+00	2.19E-01
3.58E+00	2.29E-01 2.33E-01
3.62E+00 3.66E+00	2.33E-01
3.74E+00	2.38E-01 2.43E-01
3.74E+00 3.86E+00	2.43E-01 2.48E-01
3.88E+00	2.48E-01 2.52E-01
4.17E+00	2.57E-01
4.17E+00 4.26E+00	2.62E-01
4.20E+00 4.44E+00	2.71E-01
4.63E+00	2.76E-01
4.87E+00	2.70E-01 2.81E-01
5.13E+00	2.86E-01
5.18E+00	2.91E-01
5.54E+00	2.91E-01 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	<u>3.14E-01</u> 3.19E-01
6.13E+00	3.24E-01
6.13E+00 6.17E+00	3.24E-01 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
16 225 +00	

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6.60E+00	3.67E-01
6.86E+00	3.71E-01
6.93E+00	3.76E-01
6.95E+00	3.86E-01
	3.91E-01
6.97E+00	
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
	4.57E-01
8.35E+00	
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
	maximum
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
	HIND IN THE CONTRACT OF THE CONTRACT.
1.45E+01	6.33E-01
1.51E+01	6.38E-01
	6.43E-01
1.52E+01	
	6.48E-01
1.61E+01	
1.61E+01 1.62E+01	6.52E-01
1.61E+01	

1.69E+01 1.74E+01 1.82E+01	6.67E-01 6.71E-01
	6716-01 1
1 876+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 4.42E+01	8.81E-01 8.86E-01
4.72E+01	8.91E-01
4.97E+01	8.95E-01
4.97E+01 5.12E+01	9.00E-01
6.13E+01 6.19E+01	9.05E-01 9.10E-01
6.23E+01	9.14E-01
6.32E+01	9.14E-01 9.19E-01
6.59E+01	9.24E-01
6.73E+01	9.24E-01 9.29E-01
7.47E+01	9.33E-01
7.92E+01 8.12E+01	9.38E-01 9.43E-01
8.12E+01 8.28E+01	9.43E-01 9.48E-01
8.47E+01	9.52E-01
8.96E+01	9.57E-01
	7.57L VI
9.47E+01	9.62E-01

	1 08F+02	9.67E-01
	And and a second s	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
Porosity of the surface soil layer	DERIVED(none)
Porosity of the unsaturated zone	DERIVED(none)
Saturation ratio of the surface soil	DERIVED(none)
layer		
Saturation ratio of the unsaturated	DEDIVED	\ \
zone	DERIVED(none)
Net rate of infiltration to aquifer	DERIVED(m/y)	
SCS soil classification ID	DISCRETE CUN	MULATIVE(none)
	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.I2E-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
Relative porosity value within the distribution for this soil type	UNIFORM(none	2)
	Lower Limit	0.00E+00
	Upper Limit	1.00E+00
Relative permeability value within the distribution for this soil type	UNIFORM(none	e)
	Lower Limit	0.00E+00
	Upper Limit	1.00E+00
Relative value of "b" parameter within the distribution for this soil type		1.00E+00
within the distribution for this soil	Upper Limit UNIFORM(none Lower Limit	1.00E+00
within the distribution for this soil	Upper Limit UNIFORM(none	1.00E+00
within the distribution for this soil	Upper Limit UNIFORM(none Lower Limit	1.00E+00 e) 0.00E+00 1.00E+00
within the distribution for this soil type Total water application rate on	Upper Limit UNIFORM(none Lower Limit Upper Limit	1.00E+00 e) 0.00E+00 1.00E+00
	Saturation ratio of the surface soil layer Saturation ratio of the unsaturated zone Net rate of infiltration to aquifer SCS soil classification ID SCS soil classification ID Relative porosity value within the distribution for this soil type Relative permeability value within	I.42E+02 I.77E+02 I.78E+02 I.80E+02 3.16E+02 3.16E+02 3.16E+02 3.16E+02 DERIVED(none Porosity of the unsaturated zone DERIVED(none Saturation ratio of the surface soil layer Saturation ratio of the unsaturated DERIVED(none Saturation ratio of the unsaturated DERIVED(none Saturation ratio of the unsaturated DERIVED(none Second Second

NA SA

		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	
0	Annual average irrigation rate	CONSTANT(L/m**2-d)	
Default value used	1	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	n		
Ksat1:Surface Soil	Saturated permeability of the		
Permeabiliy	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	<u>II</u> *	Value 3.65E+02	
	1	<u>value</u> 3.03E+02	
THV(1):Holdup Period : Leafy	Holdup period for leafy vegetables	CONSTANT(days)	
Default value used	JL	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	IL	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	Minimum growing period for forage consumed by milk cows	DERIVED(days)
Forage		
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		
	Minimum growing period for	
TGG(3):Growing Period : Milk Cow Grain	stored grain consumed by milk cows	DERIVED(days)

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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 Limit1.00E-01Upper Limit6.00E-01
RV(2):Interception Fraction : Other vegetables	Interception fraction for other vegetables	UNIFORM(none)
Default value used		Lower Limit 1.00E-01
RV(3):Interception Fraction : Fruits	Interception fraction for fruits	Upper Limit 6.00E-01 UNIFORM(none)
Default value used	0	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 Limit1.00E-01Upper Limit6.00E-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	Interception fraction for beef cattle grain		
Grain			
Default value used		Lower Limit Upper Limit	1.00E-01 6.00E-01
	Interception fraction for poultry grain	DERIVED(none)	
Default value used	<u> </u>		
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 L wt/m**2)	INEAR(kg wet
<u>Default value used</u>		Value 2.70E+00 2.71E+00 2.74E+00 2.76E+00 2.78E+00 2.80E+00 2.82E+00 2.85E+00 2.87E+00 2.87E+00 2.91E+00 2.93E+00 2.96E+00 3.00E+00 3.02E+00 3.04E+00 3.07E+00 3.09E+00 3.11E+00 3.13E+00	Probability 0.00E+00 1.60E-03 6.00E-03 1.76E-02 4.36E-02 8.48E-02 1.56E-01 2.57E-01 3.64E-01 5.00E-01 6.39E-01 7.46E-01 8.42E-01 9.09E-01 9.60E-01 9.94E-01 9.97E-01 1.00E+00 1.00E+00

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YV(2):Crop Yield : Other	Crop yield for other vegetables	CONTINUOU wt/m**2)	S LINEAR(kg wet
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	CONTINUOU wt/m**2)	S LINEAR(kg wet
Default value used		Value	Probability
Seruar Parae asea		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
		2.31E+00 2.32E+00	2.14E-01
		2.34E+00	3.27E-01
		2.34E+00	4.50E-01
		2.38E+00	5.76E-01
		2.40E+00	6.87E-01
		2.40E+00 2.42E+00	7.88E-01
		2.42E+00 2.43E+00	8.68E-01
		2.43E+00 2.45E+00	9.25E-01
		2.43E+00 2.47E+00	9.23E-01 9.60E-01
		$\frac{2.47E+00}{2.49E+00}$	9.81E-01
		2.49E+00 2.51E+00	9.92E-01
		2.53E+00	9.92E-01 9.98E-01
		2.53E+00 2.54E+00	9.98E-01 1.00E+00
		2.56E+00	1.00E+00
YV(4):Crop Yield: Grains	Crop yield for grains	CONTINUOU: wt/m**2)	S LINEAR(kg wet
Default value used		Value	Probability
		2.85E-01	0.00E+00
		2.90E-01	6.00E-04
		3.02E-01	2.80E-03
		13.02C-01	2.00E-03
		3.14E-01	9.40E-03

		12 50E 01	1 005 01
		3.50E-01 3.62E-01	1.08E-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 4.71E-01	9.77E-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 f	orage/m**2)
Default value used		Lower Limit	3.70E-01
		Upper Limit	5.24E-01
		p	2.36E+00
		g	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	
Default value used		Mean Standard Deviation	5.78E-01 n 7.77E-02
		Standard Deviation	<u>1</u> /.//E-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)
	الــــــــــــــــــــــــــــــــــــ		
Default value used	1		
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)
i outery may			And the second sec
Default value used			

		,
Crop yield for layer hen hay	DERIVED(kg	wet wt/m**2)
<u></u>		
Wet/dry conversion factor for leafy		en ante ai in como o clas e
vegetables	CONTINUOU	S LINEAR(none)
	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
		I.73E-01
		2.07E-01
		2.42E-01
		2.50E-01
		2.76E-01
		3.11E-01 3.45E-01
		3.80E-01
		4.15E-01
		4.49E-01
		4.84E-01
		4.99E-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
		6.91E-01
		7.25E-01
		7.50E-01
		7.60E-01
		7.94E-01 8.29E-01
		8.64E-01
		8.98E-01
		9.33E-01
	1	9.67E-01
	2.56E-01	9.91E-01
	3.24E-01	1.00E+00
Wet/dry conversion factor for other	CONTINUOU	S LINEAR(none)
vegetables		
	Value	Probability
	<u>Value</u> 3.58E-02	<u>Probability</u> 0.00E+00
	3.58E-02 4.87E-02 5.46E-02	0.00E+00 3.45E-02 6.91E-02
	3.58E-02 4.87E-02 5.46E-02 5.90E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01
	3.58E-02 4.87E-02 5.46E-02 5.90E-02 6.29E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01 1.38E-01
	3.58E-02 4.87E-02 5.46E-02 5.90E-02 6.29E-02 6.69E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01 1.38E-01 1.73E-01
	3.58E-02 4.87E-02 5.46E-02 5.90E-02 6.29E-02 6.69E-02 7.02E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01 1.38E-01 1.73E-01 2.07E-01
	3.58E-02 4.87E-02 5.46E-02 5.90E-02 6.29E-02 6.69E-02 7.02E-02 7.34E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01 1.38E-01 1.73E-01 2.07E-01 2.42E-01
	3.58E-02 4.87E-02 5.46E-02 5.90E-02 6.29E-02 6.69E-02 7.02E-02 7.34E-02 7.41E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01 1.38E-01 1.73E-01 2.07E-01 2.42E-01 2.50E-01
	3.58E-02 4.87E-02 5.46E-02 5.90E-02 6.29E-02 6.69E-02 7.02E-02 7.34E-02 7.41E-02 7.65E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01 1.38E-01 1.73E-01 2.07E-01 2.42E-01 2.50E-01 2.76E-01
	3.58E-02 4.87E-02 5.46E-02 5.90E-02 6.29E-02 6.69E-02 7.02E-02 7.34E-02 7.41E-02 7.65E-02 7.99E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01 1.38E-01 1.73E-01 2.07E-01 2.42E-01 2.50E-01 2.76E-01 3.11E-01
	3.58E-02 4.87E-02 5.46E-02 5.90E-02 6.29E-02 7.02E-02 7.34E-02 7.41E-02 7.65E-02 7.99E-02 8.32E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01 1.38E-01 2.07E-01 2.42E-01 2.50E-01 2.76E-01 3.11E-01 3.45E-01
	3.58E-02 4.87E-02 5.46E-02 5.90E-02 6.29E-02 6.69E-02 7.02E-02 7.34E-02 7.41E-02 7.65E-02 7.99E-02	0.00E+00 3.45E-02 6.91E-02 1.04E-01 1.38E-01 1.73E-01 2.07E-01 2.42E-01 2.50E-01 2.76E-01 3.11E-01
		Wet/dry conversion factor for leafy vegetables CONTINUOU Value 3.32E-02 4.89E-02 5.47E-02 5.96E-02 6.36E-02 6.36E-02 6.36E-02 7.05E-02 7.38E-02 7.48E-02 7.72E-02 8.03E-02 8.34E-02 8.34E-02 8.66E-02 9.00E-02 9.36E-02 9.36E-02 9.00E-02 9.36E-02 9.00E-02 9.36E-01 1.05E-01 1.05E-01 1.05E-01 1.05E-01 1.05E-01 1.33E-01 1.33E-01 1.33E-01 1.35E-01 1.35E-01 1.42E-01 1.50E-01 1.50E-01 1.50E-01 1.32E-01 1.35E-01 1.42E-01 1.50E-01 1.32E-01 1.35E-01 1.22E-01 1.35E-01 1.20E-01 2.56E-01 3.24E-01

		9.82E-02	4.84E-01
		9.98E-02	4.99E-01
		1.02E-01	5.18E-01
		1.06E-01 1.09E-01	5.53E-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	CONTINUOL	JS 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 8.45E-02	3.11E-01 3.45E-01
		8.43E-02 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-0I	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 3.25E-01	9.91E-01 1.00E+00
WV(4):Wet/dry : Grain	Wet/dry conversion factor for	CONSTANT	
	grains		
Default value used	0	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
		<u>p</u>	1.15E+00
	1	đ	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	1		
WF(4):Wet/dry : Layer Hen Forage	Wet/dry conversion factor for layer hen forage	DERIVED(none)	
Default value used	1		
WG(1):Wet/dry : Beef Cow Grain	Wet/dry conversion factor for beef cattle grain	CONSTANT(non	e)
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	n		
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
		<u>p</u>	1.99E+00
		<u>4</u>	9.11E-01
QF(2):Ingestion Rate : Poultry Forage	Ingestion rate for poultry forage	BETA(kg dry wt	
Default value used		Lower Limit	3.48E-03
		Upper Limit	2.82E-02 1.51E+00
		<u>e</u>	1.41E+00
	Ingestion rate for milk cow forage		

QF(3):Ingestion Rate : Milk Cow Forage		forage/d)	LINEAR(kg dry wt
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
		9.43E+00 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 9.67E-01
		1.20E+01	
		1.33E+01 1.53E+01	9.91E-01 1.00E+00
QF(4):Ingestion Rate :		1	
Layer Hen Forage	Ingestion rate for layer hen forage	BETA(kg dry w	t 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 w	
Default value used		Lower Limit	1.69E+00
Selaunt value used		Upper Limit	2.29E+00
		in	1.99E+00
			9.11E-01
	1	<u> 9</u>	7.11L-VI
QG(2):Ingestion Rate : Poultry Grain	Ingestion rate for poultry grain	BETA(kg dry wi	
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 :	Ingestion rate for milk cow grain	NORMAL(kg di	
Milk Cow Grain			

Default value used		Mean Standard Deviation	1.71E+00 2.62E-01
			2.020-01
QG(4):Ingestion Rate : Layer Hen Grain	Ingestion rate for layer hen grain	BETA(kg dry wt grair	u/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
Default value used		Upper Limit	4.58E+00
		n	1.99E+00
		<u>q</u>	9.11E-01
QH(2):Ingestion Rate : Poultry Hay	Ingestion rate for poultry hay	CONSTANT(kg dry v	
Default value used		Value 0.00E-	-00
QH(3):Ingestion Rate :		CONTINUOUS LINE	AR(kg dry wt
Milk Cow Hay	Ingestion rate for milk cow hay	hay/d)	and the only we
			1 1 ***
Default value used			robability
			00E+00
			45E-02
			91E-02
			.04E-01
			.38E-01
			73E-01
			.07E-01
		6.06E+00 2	42E-01
		6.08E+00 2	50E-01
		6.14E+00 2	.76E-01
			.11E-01
			45E-01
			.80E-01
			15E-01
			.49E-01
		And a state of the	.84E-01
			.99E-01
			.18E-01
			.53E-01
			.87E-01
			.22E-01
			.56E-01
			.91E-01
			.25E-01
			.50E-01
			.60E-01
			.94E-01
			.29E-01
			.64E-01
			.98E-01
			.33E-01
			.67E-01
			.91E-01
			.00E+00
			.001-00
QH(4):Ingestion Rate : Layer Hen Hay	Ingestion rate for layer hen hay	CONSTANT(kg dry v	vt hay/d)
Default value used		Value 0.00E-	+00
Default value used			

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

OW(1):Water Rate : Beef Water ingestion rate for beef cattle CONSTANT(L/d)

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	r(none)
Default value used	1	Value	1.00E-01
MLG(2):Mass-Loading : Poultry Grain	Mass-loading factor for poultry grain	CONSTANT	ſ(none)
Default value used		Value	1.00E-01
MLG(3):Mass-Loading : Milk Cow Grain	Mass-loading factor for milk cow grain	CONSTANT	r(none)
Default value used		Value	1.00E-01
MLG(4):Mass-Loading : Layer Hen Grain	Mass-loading factor for layer hen grain	CONSTANT	ſ(none)
Default value used	1	Value	1.00E-01
MLH(1):Mass-Loading : Beef Cattle Hay	Mass-loading factor for beef cattle hay	CONSTANT	r(none)
Default value used	d t	Value	1.00E-01
MLH(2):Mass-Loading : Poultry Hay	Mass-loading factor for poultry hay	CONSTANT	F(none)
Default value used		Value	1.00E-01
MLH(3):Mass-Loading : Milk Cow Hay	Mass-loading factor for milk cow hay	CONSTANT	r(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	r(days)
Default value used		Value	3.65E+02
	Feeding period for milk cow grain	CONSTANT	F(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	CONSTAN	NT(days)
Default value used	JL	Value	3.65E+02
TFH(1):Feeding Period :			
Beef Cattle Hay	Feeding period for beef cattle hay	CONSTAN	NT(days)
Default value used		Value	3.65E+02
TFH(2):Feeding Period : Poultry Hay	Feeding period for poultry hay	CONSTAN	NT(days)
Default value used]	Value	3.65E+02
TFH(3):Feeding Period : Milk Cow Hay	Feeding period for milk cow hay	CONSTAN	NT(days)
Default value used		Value	3.65E+02
TFH(4):Feeding Period :			
Layer Hen Hay	Feeding period for layer hen hay	CONSTAN	NT(days)
Default value used		Value	3.65E+02
TFW(1):Water Period : Beef Cattle	Water ingestion period for beef cattle	CONSTAN	NT(days)
Default value used		Value	3.65E+02
TFW(2):Water Period : Poultry	Water ingestion period for poultry	CONSTAN	NT(days)
Default value used	J	Value	3.65E+02
TFW(3):Water Period : Milk Cows	Water ingestion period for milk cows	CONSTAN	NT(days)
Default value used		Value	3.65E+02
TFW(4):Water Period :	Water ingestion period for layer		5.051.102
Layer Hens	hens	CONSTAN	NT(days)
Default value used		Value	3.65E+02
fha(1):Hydrogen Fraction : Beef Cattle	Hydrogen fraction for beef cattle	CONSTAN	NT(none)
Default value used		Value	1.00E-01
fha(2):Hydrogen Fraction : Poultry	Hydrogen fraction for poultry	CONSTAN	
Default value used		Value	1.00E-01
fha(3):Hydrogen Fraction : Milk Cows	Hydrogen fraction for milk cows	CONSTAN	NT(none)
Default value used		Value	1.10E-01
fha(4):Hydrogen		1	
Fraction : Eggs	Hydrogen fraction for eggs	CONSTAN	NI(none)
Default value used		Value	1.10E-01
fhv(1):Hydrogen Fraction : Leafy	Hydrogen fraction for leafy vegetables	CONSTAN	NT(none)
Vegetables		Value	1.005.01
Default value used	Hudrooon frontion for the		1.00E-01
	Hydrogen fraction for other vegetables	CONSTAN	

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	Hydrogen fraction for grains	CONSTANT(none)
Fraction : Grains		
Default value used		<u>Value</u> 6.80E-02
fhf(1):Hydrogen Fraction : Beef Cow	Hydrogen fraction for beef cattle	CONSTANT(none)
Forage	forage	
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	1	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	CONSTAN	
Default value used		Value	6.80E-02
fhd016:Hydrogen Fraction : Soil	Fraction of hydrogen in soil	DERIVED(1	none)
Default value used	JL		
sasvh:Tritium Equivalence: Plant/Soil	Tritium equivalence: plant/soil	CONSTAN	Γ(none)
Default value used		Value	1.00E+00
sawvh:Tritium Equivalence: Plant/Water	Tritium equivalence: plant/water	CONSTAN	Γ(none)
Default value used		Value	1.00E+00
satah:Tritium Equivalence: Animal Products	Tritium equivalence: animal product intake	CONSTAN	Γ(none)
Default value used		Value	1.00E+00
YA(1):Animal Product Yield : Beef Cattle	Annual yield of beef per individual animal	CONSTAN	Г(kg/y)
Default value used		Value	2.09E+02
YA(2):Animal Product Yield : Poultry	Annual yield of chicken per individual animal	CONSTAN	Г(kg/y)
Default value used		Value	1.53E+00
YA(3):Animal Product Yield : Milk Cows	Annual yield of milk per individual animal	CONSTAN	Г(L/y)
Default value used		Value	7.41E+03
YA(4):Animal Product Yield : Layer Hens	Annual yield of eggs per individual animal	CONSTAN	Γ(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	CONSTAN	Γ(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	CONSTAN	Γ(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	CONSTAN	Γ(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(1	n**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		
ARAII: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 Description		Distribution		
Pb:Coefficient	Partition coefficient for Pb	NORMAL(Log10(mL/g))		
Default value used		Mean3.38E+00Standard Deviation1.20E+00		
Bi:Coefficient	Partition coefficient for Bi	NORMAL(Log10(mL/g))		
Default value used		Mean2.65E+00Standard Deviation1.40E+00		
Po:Coefficient	Partition coefficient for Po	NORMAL(Log10(mL/g))		
Default value used		Mean2.26E+00Standard Deviation7.30E-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		Mean3.55E+00Standard Deviation7.40E-01		
Pb:Leafy	Leafy plant concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt leafy p pCi/kg soil)		
Default value used		Mean of Ln(X)-3.10E+00Standard Deviation of Ln9.04E-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+00Standard Deviation of Ln9.04E-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+00Standard Deviation of Ln9.04E-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+00Standard Deviation of Ln9.04E-01		

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Pb:Root	Root plant concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt roots pe pCi/kg soil)
Default value used		Mean of Ln(X)-4.71E+00Standard Deviation of Ln9.04E-01
Bi:Root	Root plant concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt roots pe pCi/kg soil)
Default value used	!	Mean of Ln(X)-5.30E+00Standard Deviation of Ln9.04E-01
Po:Root	Root plant concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt roots pe pCi/kg soil)
Default value used		Mean of Ln(X)-7.82E+00Standard Deviation of Ln9.04E-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 pe pCi/kg soil)
Default value used		Mean of Ln(X)-6.50E+00Standard Deviation of Ln9.04E-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+00Standard Deviation of Ln9.04E-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+00Standard Deviation of Ln9.04E-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+00Standard Deviation of Ln9.04E-01
Rn:Fruit	Fruit concentration factor for Rn	CONSTANT(pCi/kg dry-wt fruit per pCi/kg soil)
Default value used		<u>Value</u> 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+00Standard Deviation of Ln9.04E-01
Pb:Grain	Grain concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt grain pe pCi/kg soil)
Default value used		Mean of Ln(X)-4.71E+00Standard Deviation of Ln9.04E-01
Bi:Grain	Grain concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt grain pe pCi/kg soil)
Default value used		Mean of Ln(X)-5.30E+00Standard Deviation of Ln9.04E-01
Po:Grain	Grain concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt grain pe pCi/kg soil)
Default value used		Mean of Ln(X)-7.82E+00Standard Deviation of Ln9.04E-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	

Default value used		pCi/kg soil) Mean of Ln(X)	-6.50E+00
	1	Standard Deviation of Ln	9.04E-01
Pb:Beef	Beef transfer factor for Pb	CONSTANT(d/kg)	
Default value used	1	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)	, , , - M ⁻ Mit
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	JI	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	
	Egg transfer factor for D:	CONSTANT(d/kg)	
Bi:Eggs	Egg transfer factor for Bi		
Default value used	Eag transfor factor for De	Value 8.00E-01 CONSTANT(d/kg)	
Po:Eggs	Egg transfer factor for Po		
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 water)	fish per pCi/

Default value used		Value 1.00E+02
IBIORCE IBIORCEUTIATION TACTOR FOR BEING TISK		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)

r				
l			T 1. 1. 4	
		External	Inhalation	
1	1	11	1	

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

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- 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	Concentration	Area (m2)	Calculated	Notes
soil	(pCi/gm)		Annual TEDE	
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 <u>actual</u> soil concentration, post remediation, and its calculated dose for Ra-226 and Ra-226+C. Area value is the actual remediated area in m². Refer to 5.c below.

Contaminant in	Concentration	Area (m2)	Calculated	Notes
soil	(pCi/gm)		Annual TEDE	
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 m². The table below indicates the dose results of the D&D Dose modeling code for 2 m², 4.6 m², 10 m², 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 m².

Contaminant in	Concentration	Area (m2)	Calculated	Notes
soil	(pCi/gm)		Annual TEDE	
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.		<u>Value</u> 4.00E+01

Site Specific Parameters:

General Parameters:

DandD Residential Scenario

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:

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DandD Residential Scenario

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





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		<u>Value</u> 2.36E+00

Site Specific Parameters:

General Parameters:

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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 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:

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None

Element Dependant Parameters

None

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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.		<u>Value</u> 4.00E+01

Site Specific Parameters:

General Parameters:

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Element Dependant Parameters

None

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.		<u>Value</u> 4.00E+01

Site Specific Parameters:

General Parameters:

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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.		<u>Value</u> 2.36E+00	

Site Specific Parameters:

General Parameters:

None

Element Dependant Parameters

None

*b=

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 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:

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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		<u>Value</u> 2.36E+00

Chain Data:

Number of chains: 1

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

Nuclid	e Chain Position	1	Fractional Yield				
						Rate	Rate

							Factor (Sv/Bq)	(Sv/Bq)	((Sv/d)/	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	1 1	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	12.54E-06 I	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		<u>Value</u> 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		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 Translocation factor for forage Forage Consumed by beef cattle		CONSTANT(none)		
Default value used		<u>Value</u> 1.00E+00		

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

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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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	IT(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	CONSTAN	IT(none)
Default value used		Value	7.00E-02
	Mass fraction of dry soil that is carbon	CONSTAN	IT(none)

Fraction Default value used	11	Value 3.00E-02
	Specific activity equivalence of	<u>value</u> 5.00E-02
SATac:Animal Product Specific Activity	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		<u>Value</u> 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		<u>Value</u> 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		<u>Value 1.00E+00</u>
xh(3):Milk Cow Hay Contaminated Fraction	Fraction of stored hay consumed by milk cows that is contaminated	CONSTANT(none)
Default value used		<u>Value</u> 1.00E+00
kh(4):Layer Hen Hay Contaminated Fraction	Fraction of stored hay consumed by layer hens that is contaminated	CONSTANT(none)
Default value used		<u>Value</u> 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
Jelault value used		

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		<u>Value</u> 1.00E+00
Uv(1):Diet - Leafy	Yearly human consumption of leafy vegetables	CONSTANT(kg/y)
Default value used		<u>Value 2.14E+01</u>
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	1	<u>Value</u> 1.44E+01
Ua(1):Diet - Beef	Yearly human consumption of beef	
Default value used		Value 3.98E+01
Ua(2):Diet - Poultry	Yearly human consumption of poultry	CONSTANT(kg/y)
Default value used	1	<u>Value</u> 2.53E+01
Ua(3):Diet - Milk	Yearly human consumption of milk	
Default value used		<u>Value</u> 2.33E+02
Ua(4):Diet - Egg	Yearly human consumption of eggs	CONSTANT(kg/y)
Default value used		<u>Value</u> 1.91E+01
Uf:Diet - Fish	Yearly human consumption of fish produced from an onsite pond	CONSTANT(kg/y)
Default value used		<u>Value</u> 2.06E+01
tf:Consumption Period	Consumption period for fish	CONSTANT(days)
Default value used		<u>Value</u> 3.65E+02
tcv(1):Consumption Period - Leafy	Food consumption period for leafy vegetables	CONSTANT(days)
Default value used		<u>Value</u> 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	CONSTAN	Γ(days)
Default value used		Value	3.65E+02
tca(2):Consumption Period - Poultry	Food consumption period for poultry	CONSTAN	Γ(days)
Default value used	<u>, , , , , , , , , , , , , , , , , , , </u>	Value	3.65E+02
tca(3):Consumption Period - Milk	Food consumption period for milk	CONSTANT	Γ(days)
Default value used		Value	3.65E+02
tca(4):Consumption Period - Egg	Food consumption period for eggs	CONSTANT	ſ(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	T(days)
Default value used		Value	0.00E+00
TendR:End Time	The ending time of the scenario in days	CONSTANI	(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)r	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 Upper Limit	2.00E-02 3.00E-01
	1		

RFR:Indoor Resuspension Factor	Resuspension factor for indoor dust	t LOGUNIFORM(1/m)
Default value used		Lower Limit Upper Limit	1.00E-07 8.00E-05
CDO:Outdoor Dust Loading	Average dust loading outdoors	LOGUNIFORM(g/m**3)
Default value used		Lower Limit Upper Limit	1.00E-07 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 1.4	40E+00
VG:Gardening Breathin Rate	g Breathing rate while gardening	CONSTANT(m**	
Default value used		Value 1.7	70E+00
GR:Soil Ingestion Transfer Rate	Average rate of soil ingestion	CONSTANT(g/d)	
Default value used	1	Value 5.	00E-02
UW:Diet - Water	Drinking water ingestion rate	CONSTANT(L/d	
Default value used	Israking water ingestion rate		, 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 I	
Default value used		Value	Probability
		3.05E-01	0.00E+00
		6.68E-01	4.76E-03
		8.11E-01 9.21E-01	9.52E-03 1.43E-02
		9.94E-01	1.43E-02 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 1.32E+00	4.76E-02 5.24E-02

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	6 7 1E 00
1.56E+00	5.71E-02
1.58E+00 1.61E+00	<u>6.19E-02</u> 6.67E-02
1.61E+00 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
11	

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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
1.51E+01	6.43E-01
	6.48E-01
11 61 E+01	
1.61E+01	
1.62E+01	6.52E-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
2.01E+01	7.05E-01
2.07E+01 2.08E+01	7.10E-01
	7.14E-01
2.17E+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
	7.91E-01
2.94E+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
4.24E+01 4.29E+01	8.81E-01
4.29E+01 4.42E+01	8.86E-01
4.42E+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
0.4/12/01	
	9.57E-01
8.96E+01 9.47E+01	9.57E-01 9.62E-01

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		1.08E+02 1.13E+02	9.67E-01 9.71E-01
		1.15E+02 1.42E+02	9.76E-01 9.81E-01
		1.77E+02 .	9.86E-01
		1.78E+02	9.91E-01
		1.80E+02	9.95E-01
	1	3.16E+02	1.00E+00
	Porosity of the surface soil layer	DERIVED(none)
Default value used	1		
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 ratio of the unsaturated		
Saturation	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 CUN	/ULATIVE(none)
Default value used	L	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 1.00E+01	2.85E-01 5.10E-01
		1.10E+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		T annual T toutt	0.00E+00
Default value useu		Lower Limit	
Detault value useu		Upper Limit	1.00E+00
KSDEV:Permeability Probability	Relative permeability value within the distribution for this soil type		1.00E+00
KSDEV:Permeability Probability		<u>Upper Limit</u> UNIFORM(none Lower Limit	1.00E+00
KSDEV:Permeability Probability	the distribution for this soil type	Upper Limit UNIFORM(none	1.00E+00
KSDEV:Permeability Probability Default value used BDEV:Parameter "b"		<u>Upper Limit</u> UNIFORM(none Lower Limit	1.00E+00 0.00E+00 1.00E+00
KSDEV:Permeability	the distribution for this soil type Relative value of "b" parameter within the distribution for this soil	Upper Limit UNIFORM(none Lower Limit Upper Limit UNIFORM(none Lower Limit	1.00E+00 0.00E+00 1.00E+00 0.00E+00
KSDEV:Permeability Probability Default value used BDEV:Parameter "b" Probability Default value used AP:Water Application	the distribution for this soil type Relative value of "b" parameter within the distribution for this soil	Upper Limit UNIFORM(none Lower Limit Upper Limit UNIFORM(none	1.00E+00 0.00E+00 1.00E+00 0.00E+00 1.00E+00 1.00E+00
KSDEV:Permeability Probability Default value used BDEV:Parameter "b" Probability	the distribution for this soil type Relative value of "b" parameter within the distribution for this soil type Total water application rate on	Upper Limit UNIFORM(none Lower Limit Upper Limit UNIFORM(none Lower Limit Upper Limit	1.00E+00 0.00E+00 1.00E+00 0.00E+00 1.00E+00 1.00E+00

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		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	Bulk density of soil in the surface	DERIVED(g/mL)
Density	soil layer	
Default value used		
RHO2:Unsaturated Zone		DERIVED(g/mL)
Density	unsaturated zone	
Default value used][
Ksat1:Surface Soil	Saturated permeability of the	DERIVED(cm/sec)
Permeabiliy	surface soil layer	
Default value used	1	
VDR:Volume of Water	Volume of water withdrawn for	CONSTANT(L)
Consumed consumptive use		
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	1	
sh:Soil Moisture Content	Moisture content of soil	DERIVED(none)
Default value used	<u>[[]</u>	
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 :	Holdup period for leafy vegetables	CONSTANT(days)
Leafy		
Default value used		<u>Value</u> 1.00E+00
ГНV(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	Lean and a second s	Value 1.40E+01
THV(4)·Holdun Period ·		
Grains	Holdup period for grains	CONSTANT(days)
		Value 1.40E+01

THA(1):Holdup Period : Beef	Holdup period for beef	CONSTAN	T(days)
Default value used	11	Value	2.00E+01
THA(2):Holdup Period : Poultry	Holdup period for poultry	CONSTAN	T(days)
Default value used		Value	1.00E+00
THA(3):Holdup Period : Milk	Holdup period for milk	CONSTAN	T(days)
Default value used		Value	1.00E+00
THA(4):Holdup Period : Eggs	Holdup period for eggs	CONSTAN	IT(days)
Default value used		Value	1.00E+00
TGV(1):Growing Period : Leafy	Minimum growing period for leafy vegetables	CONSTAN	T(days)
Default value used		Value	4.50E+01
TGV(2):Growing Period : Other vegetables	Minimum growing period for other vegetables	CONSTAN	T(days)
Default value used		Value	9.00E+01
TGV(3):Growing Period : Fruits	Minimum growing period for fruits	CONSTAN	T(days)
Default value used		Value	9.00E+01
TGV(4):Growing Period : Grains	Minimum growing period for grains	CONSTAN	T(days)
Default value used		Value	9.00E+01
TGF(1):Growing Period : Beef Forage	Minimum growing period for forage consumed by beef cattle	CONSTAN	T(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	CONSTAN	T(days)
Default value used	1	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	۵٬۰۰۹ <u>مېر دې د ۲۰۰۵ ماند و ور د ۲۰۰۵ ماند و د ۲۰۰۵ ماند و ۲۰۰۵ ماند و ۲۰</u> ۰۰ ماند و ۲۰۰۰ ماند و ۲۰۰۰ ماند و ۲۰۰۰	
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
RF(2):Interception Fraction : Poultry forage	Interception fraction for poultry forage	Upper Limit 6.00E-01 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	d 1.	

Interception fraction for beef cattle grain		
<u>t</u>	Lower Limit Upper Limit	1.00E-01 6.00E-01
Interception fraction for poultry grain	DERIVED(none)	
Interception fraction for milk cow grain	DERIVED(none)	
Interception fraction for layer hen grain	DERIVED(none)	
<u></u>		
-	DERIVED(none)	
		<u></u>
Interception fraction for poultry hay	DERIVED(none)	*******
	DERIVED(none)	<u></u>
		<u> </u>
Interception fraction for layer hen hay	DERIVED(none)	
Crop yield for leafy vegetables	CONTINUOUS L. wt/m**2)	INEAR(kg wet
	2.70E+00 2.71E+00 2.74E+00 2.76E+00 2.78E+00 2.80E+00 2.82E+00 2.82E+00 2.87E+00 2.87E+00 2.91E+00 2.93E+00 2.96E+00 3.02E+00 3.02E+00 3.04E+00 3.07E+00 3.09E+00 3.11E+00	Probability 0.00E+00 1.60E-03 6.00E-03 1.76E-02 4.36E-02 8.48E-02 1.56E-01 2.57E-01 3.64E-01 5.00E-01 6.39E-01 7.46E-01 8.42E-01 9.09E-01 9.60E-01 9.94E-01 9.97E-01 9.99E-01 1.00E+00 1.00E+00
	grain Interception fraction for poultry grain Interception fraction for milk cow grain Interception fraction for layer hen grain Interception fraction for beef cattle hay Interception fraction for poultry hay Interception fraction for milk cow hay Interception fraction for layer hen	grain Lower Limit Upper Limit Interception fraction for poultry grain DERIVED(none) Interception fraction for milk cow grain DERIVED(none) Interception fraction for layer hen grain DERIVED(none) Interception fraction for beef cattle hay DERIVED(none) Interception fraction for poultry hay DERIVED(none) Interception fraction for poultry hay DERIVED(none) Interception fraction for milk cow hay DERIVED(none) Interception fraction for layer hen hay NDERIVED(none) Interception fraction for layer hen hay NDERIVED(none) INTERIVED(NONE) INTERIVED(NO

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YV(2):Crop Yield : Other	Crop yield for other vegetables	CONTINUOU wt/m**2)	JS LINEAR(kg wet
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 9.42E-01
		2.45E+00 2.47E+00	<u>9.42E-01</u> 9.75E-01
		2.47E+00 2.48E+00	9.73E-01 9.88E-01
		2.48E+00 2.49E+00	9.88E-01 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
(X)(2), C. X/ 11			
YV(3):Crop Yield : Fruits	Crop yield for fruits	wt/m**2)	S LINEAR(kg wet
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 2.42E+00	6.87E-01
			7.88E-01 8.68E-01
		2.43E+00 2.45E+00	9.25E-01
		2.43E+00 2.47E+00	9.23E-01 9.60E-01
		2.47E+00 2.49E+00	9.81E-01
		2.51E+00	9.91E-01
		2.53E+00	9.92E-01
		2.54E+00	1.00E+00
		2.56E+00	1.00E+00
V(4):Crop Yield :	Crop yield for grains	CONTINUOUS	S LINEAR(kg wet
Grains		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 3.38E-01	2.14E-02 5.42E-02

		2 50E 01	1.09E.01
		3.50E-01 3.62E-01	1.08E-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 5.07E-01	9.99E-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
Securit Fundo usou		Upper Limit	5.24E-01
		p	2.36E+00
		g	1.40E+00
YF(2):Crop Yield : Poultry Forage	Crop yield for poultry forage	DERIVED(kg w	et wt forage/m**2)
Default value used			
YF(3):Crop Yield : Milk			
Cow Forage	Crop yield for milk cow forage	DERIVED(kg w	et 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 dr	y wt grain /m**2)
Default value used		Mean	5.78E-01
Demail Fundo usod		Standard Deviati	
YG(2):Crop Yield : Poultry Grain	Crop yield for poultry grain		et wt grain /m**2)
Default value used			an a
	r		
Cow Grain	Crop yield for milk cow grain	DERIVED(kg w	et wt grain /m**2)
Default value used			
YG(4):Crop Yield :	Cross wield for laws h	DEDIVED/	at wet and in /
Layer Hen Grain	Crop yield for layer hen grain	DERIVED(kg w	et wt grain /m**2)
Default value used	The second se		
	[1	
Cow Hay	Crop yield for beef cattle hay	DERIVED(kg w	et wt/m**2)
Default value used			
YH(2):Crop Yield : Poultry Hay	Crop yield for poultry hay	DERIVED(kg w	et wt/m**2)
Default value used YH(3):Crop Yield : Milk Cow Hay			

YH(4):Crop Yield :	Comparial of family and have been been been been been been been be	DEDUCED	wot wt/**0
Layer Hen Hay	Crop yield for layer hen hay	DERIVED(kg wet wt/m**2)	
Default value used			
WV(1):Wet/dry : Leafy	Wet/dry conversion factor for leafy		
Vegetables	vegetables	CONTINUOU	JS LINEAR(none)
Default value used	-	Value	<u>Probability</u>
		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 8.03E-02	2.76E-01 3.11E-01
		8.03E-02 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 1.59E-01	8.29E-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		
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 9.05E-02	3.80E-01 4.15E-01
		9.41E-02	4.13E-01 4.49E-01

	1.24E-01 1.29E-01	6.91E-01 7.25E-01
<i>.</i>	1.14E-01 1.19E-01	5.87E-01 6.22E-01 6.56E-01
	1.02E-01 1.06E-01	4.99E-01 5.18E-01 5.53E-01
	9.46E-02 9.82E-02	4.49E-01 4.84E-01
	8.78E-02	3.45E-01 3.80E-01 4.15E-01
	7.78E-02 8.13E-02	2.76E-01 3.11E-01
	7.44E-02	2.07E-01 2.42E-01 2.50E-01
	6.72E-02	1.38E-01 1.73E-01 2.07E-01
	5.93E-02	6.91E-02 1.04E-01
	3.66E-02 4.87E-02	0.00E+00 3.45E-02
Wet/dry conversion factor for fruit		Probability
	3.13E-01	1.00E+00
	2.12E-01 2.62E-01	9.67E-01 9.91E-01
	1.70E-01 1.87E-01	8.98E-01 9.33E-01
	1.50E-01 1.59E-01	8.29E-01 8.64E-01
	1.42E-01	7.94E-01
	1.33E-01	7.50E-01 7.60E-01
		6.91E-01 7.25E-01
	1.19E-01	6.56E-01
		5.87E-01 6.22E-01
	1.06E-01	5.53E-01
	9.98E-02 1.02E-01	4.99E-01 5.18E-01
	Wet/dry conversion factor for fruit	I.06E-01 I.09E-01 I.14E-01 I.19E-01 I.24E-01 I.29E-01 I.33E-01 I.35E-01 I.42E-01 I.50E-01 I.59E-01 I.70E-01 I.70E-02 7.44E-02 7.52E-02 7.78E-02 8.13E-02 8.45E-02 9.78E-02 9.78E-02 9.78E-02 9.78E-02 9.78E-02 9.78E-02 9.78E-02 9.78E-02 9.78E-02 <t< td=""></t<>

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Default value used		Lower Limit	1.83E-01
		<u>Upper Limit</u>	3.23E-01
		<u>p</u>	1.15E+00
		<u> q</u>	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	Wet/dry conversion factor for milk		
Cow Forage	cow forage	DERIVED(none)
Default value used			
WF(4):Wet/dry : Layer	Wet/dry conversion factor for layer	1	
Hen Forage	hen forage	DERIVED(none))
Default value used	<u>J</u>]	
WG(1):Wet/dry : Beef	Wet/dry conversion factor for beef		
Cow Grain	cattle grain	CONSTANT(noi	ne)
Default value used		Value 8	8.80E-01
WG(2):Wet/dry : Poultry		DEDIVED	
Grain	poultry grain	DERIVED(none)	
Default value used			
WG(3):Wet/dry : Milk	Wet/dry conversion factor for milk		
Cow Grain	cow grain	DERIVED(none)	
Default value used			
WG(4):Wet/dry : Layer	Wet/dry conversion factor for layer		n a shekara a shekara da ba shekara da shekara a s
Hen Grain	hen grain	DERIVED(none)	
Default value used	<u></u>		
WH(1):Wet/dry : Beef			
Cow Hay	Wet/dry conversion factor for beef cattle hay	DERIVED(none)	
Default value used		[<u></u>	
WH(2):Wet/dry:Poultry Hay	poultry hay	DERIVED(none)	
Default value used	<u>point j 111 j</u>		
		[
WH(3):Wet/dry : Milk	Wet/dry conversion factor for milk cow hay	DERIVED(none)	
	con huy		
Default value used			
WH(4):Wet/dry : Layer	Wet/dry conversion factor for layer	DERIVED(none)	
	hen hay	<u>```</u>	
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
		<u>q</u>	9.11E-01
QF(2):Ingestion Rate : Poultry Forage	Ingestion rate for poultry forage	BETA(kg dry wt f	forage/d)
Default value used		Lower Limit	3.48E-03
		Upper Limit	2.82E-02
		<u>p</u>	1.51E+00
		q	1.41E+00

QF(3):Ingestion Rate : Milk Cow Forage		forage/d)	LINEAR(kg dry w
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
		g	7.92E-01
QG(1):Ingestion Rate : Beef Cattle Grain	Ingestion rate for beef cattle grain	BETA(kg dry wi	grain/d)
Default value used	and the second sec	Lower Limit	1.69E+00
Sound Fund abou		Upper Limit	2.29E+00
		n n	1.99E+00
		<u>q</u>	9.11E-01
			7.1115-01
QG(2):Ingestion Rate : Poultry Grain	Ingestion rate for poultry grain	BETA(kg dry wi	
Default value used		Lower Limit	1.04E-02
		<u>Upper Limit</u>	8.45E-02
		p	1.51E+00
		<u>q</u>	1.41E+00
QG(3):Ingestion Rate : Milk Cow Grain	Ingestion rate for milk cow grain	NORMAL(kg di	ry wt grain/d)

<u>Default value used</u>		Mean Standard Deviation	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
		<u>p</u>	1.43E+00
		g	7.92E-01
QH(1):Ingestion Rate : Beef Cattle Hay	Ingestion rate for beef cattle hay	BETA(kg dry wt hay/	i)
Default value used		Lower Limit	3.38E+00
		Upper Limit	4.58E+00
		p	1.99E+00
		đ	9.11E-01
QH(2):Ingestion Rate : Poultry Hay	Ingestion rate for poultry hay	CONSTANT(kg dry v	/t hay/d)
Default value used		Value 0.00E+	00
QH(3):Ingestion Rate :		CONTINUOUS LINE	AR(ke drv wt
Milk Cow Hay	Ingestion rate for milk cow hay	hay/d)	
Default value used	JL		obability
Jorault value useu			008+00
			45E-02
			91E-02
			04E-01
			38E-01
			73E-01
			07E-01
			42E-01
			50E-01
			76E-01
			11E-01
			45E-01
			BOE-01
			15E-01
			49E-01
			34E-01
			99E-01
			8E-01
			53E-01
			37E-01
			22E-01
			56E-01
			91E-01
			25E-01
			50E-01
			50E-01
			94E-01
			29E-01
		A REAL PROPERTY OF THE REAL PR	54E-01
			28E-01
			3E-01
			57E-01
			01E-01
			01E-01 00E+00
2H(4):Ingestion Rate : Layer Hen Hay	Ingestion rate for layer hen hay		00E+00

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

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Default value used		Value	1.00E-01
MLF(4):Mass-Loading : Layer Hen Forage	Mass-loading factor for layer hen forage	CONSTA	NT(none)
Default value used	31	Value	1.00E-01
MLG(1):Mass-Loading : Beef Cattle Grain	Mass-loading factor for beef cattle grain	CONSTA	NT(none)
Default value used		Value	1.00E-01
MLG(2):Mass-Loading : Poultry Grain	Mass-loading factor for poultry grain	CONSTA	NT(none)
Default value used		Value	1.00E-01
MLG(3):Mass-Loading : Milk Cow Grain	Mass-loading factor for milk cow grain	CONSTAI	NT(none)
Default value used		Value	1.00E-01
MLG(4):Mass-Loading : Layer Hen Grain	Mass-loading factor for layer hen grain	CONSTA	NT(none)
Default value used		Value	1.00E-01
MLH(1):Mass-Loading : Beef Cattle Hay	Mass-loading factor for beef cattle hay	CONSTAN	NT(none)
Default value used		Value	1.00E-01
MLH(2):Mass-Loading : Poultry Hay	Mass-loading factor for poultry hay	CONSTAN	NT(none)
Default value used		Value	1.00E-01
MLH(3):Mass-Loading : Milk Cow Hay	Mass-loading factor for milk cow hay	CONSTAN	NT(none)
Default value used		Value	1.00E-01
MLH(4):Mass-Loading : Layer Hen Hay	Mass-loading factor for layer hen hay	CONSTAN	VT(none)
Default value used		Value	1.00E-01
FFF(1):Feeding Period : Beef Cow Forage	Feeding period for beef cattle forage	CONSTAN	JT(days)
Default value used		Value	3.65E+02
FFF(2):Feeding Period : Poultry Forage	Feeding period for poultry forage	CONSTAN	JT(days)
Default value used		Value	3.65E+02
FFF(3):Feeding Period : Milk Cow Forage	Feeding period for milk cow forage	CONSTAN	VT(days)
Default value used		Value	3.65E+02
IFF(4):Feeding Period : Layer Hen Forage	Feeding period for layer hen forage	CONSTAN	IT(days)
Default value used		Value	3.65E+02
FFG(1):Feeding Period : Beef Cattle Grain	Feeding period for beef cattle grain	CONSTAN	IT(days)
Default value used		Value	3.65E+02
FFG(2):Feeding Period : Poultry Grain	Feeding period for poultry grain	CONSTAN	IT(days)
Default value used		Value	3.65E+02
	Feeding period for milk cow grain	CONSTAN	T(dave)

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Default value used	And the Argenting of the	Value	3.65E+02
TFG(4):Feeding Period :	1		5.65E+02
Layer Hen Grain	Feeding period for layer hen grain	CONSTA	NT(days)
Default value used		Value	3.65E+02
TFH(1):Feeding Period :			
Beef Cattle Hay	Feeding period for beef cattle hay	CONSTA	NT(days)
Default value used		Value	3.65E+02
TFH(2):Feeding Period :	Feeding period for poultry hay	CONSTA	NT(days)
Poultry Hay			
Default value used	I	Value	3.65E+02
TFH(3):Feeding Period : Milk Cow Hay	Feeding period for milk cow hay	CONSTA	NT(days)
Default value used		Value	3.65E+02
TFH(4):Feeding Period :			
Layer Hen Hay	Feeding period for layer hen hay	CONSTA	NT(days)
Default value used		Value	3.65E+02
TFW(1):Water Period : Beef Cattle	Water ingestion period for beef cattle	CONSTA	NT(days)
Default value used	J	Value	3.65E+02
TFW(2):Water Period : Poultry	Water ingestion period for poultry	CONSTA	NT(days)
Default value used		Value	3.65E+02
TFW(3):Water Period :	Water ingestion period for milk		
Milk Cows	cows	CONSTANT(days)	
Default value used		Value	3.65E+02
TFW(4):Water Period :	Water ingestion period for layer	CONFETA	NT(days)
Layer Hens	hens	CONSTA	(days)
Default value used		Value	3.65E+02
fha(1):Hydrogen Fraction : Beef Cattle	Hydrogen fraction for beef cattle	CONSTA	NT(none)
Default value used		Value	1.00E-01
fha(2):Hydrogen Fraction : Poultry	Hydrogen fraction for poultry	CONSTA	NT(none)
Default value used		Value	1.00E-01
fha(3):Hydrogen Fraction : Milk Cows	Hydrogen fraction for milk cows	CONSTA	NT(none)
Default value used		Value	1.10E-01
fha(4):Hydrogen Fraction : Eggs	Hydrogen fraction for eggs	CONSTA	NT(none)
Default value used]	Value	1.10E-01
fhv(1):Hydrogen			
Hydrogen fraction for leafy		CONSTANT(none)	
Vegetables	vegetables		
Default value used		Value	1.00E-01
	Hydrogen fraction for other vegetables	CONSTA	NT(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	Hydrogen fraction for grains	CONSTANT(none)
Fraction : Grains		
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	H	Value 1.00E-01
fhf(3):Hydrogen Fraction : Milk Cow Forage	Hydrogen fraction for milk cow forage	CONSTANT(none)
Default value used	JL	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	11	Value 1.00E-01
fhh(3):Hydrogen Fraction : Milk Cow Hay	Hydrogen fraction for milk cow	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
hg(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	IL	Value	6.80E-02
fhg(4):Hydrogen			
Fraction : Layer Hen grain		CONSTAN	T(none)
Grain	gram		
Default value used		Value	6.80E-02
fhd016:Hydrogen Fraction : Soil	Fraction of hydrogen in soil	DERIVED()	none)
Default value used			
sasvh:Tritium	Tritium equivalence: plant/soil	CONSTAN	T(none)
Equivalence: Plant/Soil			
Default value used		Value	1.00E+00
sawvh:Tritium	Tritium aquinalan aquinter	CONSTANT	T(nono)
Equivalence: Plant/Water	Tritium equivalence: plant/water	CONSTAN	r (none)
Default value used		Value	1.00E+00
satah:Tritium			
Equivalence: Animal Products		CONSTAN	T(none)
Default value used		Value	1.00E+00
YA(1):Animal ProductAnnual yield of beef per individualYield : Beef Cattleanimal		CONSTANT(kg/y)	
Default value used		Value	2.09E+02
YA(2):Animal Product Yield : Poultry Annual yield of chicken per individual animal		CONSTAN	T(kg/y)
Default value used		Value	1.53E+00
YA(3):Animal Product Yield : Milk Cows	Annual yield of milk per individual animal	CONSTAN	T(L/y)
Default value used		Value	7.41E+03
YA(4):Animal Product Yield : Layer Hens	Annual yield of eggs per individual animal	CONSTAN	T(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	CONSTAN	T(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	CONSTAN	T(m**2)
Default value used	during residential period	Value	1.00E+02
	Minimum surface area to which		1.000.00
ARIng:Secondary Ingestion Exposure Area	resident is exposed via secondary ingestion during residential period	CONSTAN	T(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)

DandD Residential Scenario

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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			
ARAII: 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))	
<u>Default value used</u>		Mean3.38E+00Standard Deviation1.20E+00	
Bi:Coefficient	Partition coefficient for Bi	NORMAL(Log10(mL/g))	
Default value used		Mean2.65E+00Standard Deviation1.40E+00	
Po:Coefficient	Partition coefficient for Po	NORMAL(Log10(mL/g))	
Default value used		Mean2.26E+00Standard Deviation7.30E-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		Mean3.55E+00Standard Deviation7.40E-01	
Pb:Leafy	Leafy plant concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt leafy pe pCi/kg soil)	
Default value used		Mean of Ln(X)-3.10E+0Standard Deviation of Ln9.04E-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+0Standard Deviation of Ln9.04E-01	
Po:Leafy	Leafy plant concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt leafy p pCi/kg soil)	
Default value used		Mean of Ln(X)-5.99E+0Standard Deviation of Ln9.04E-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	Default value used Mean of Ln(X) -4.2 Standard Deviation of Ln 9.04		

Pb:Root	Root plant concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt roots pe pCi/kg soil)	
Default value used	1	Mean of Ln(X)-4.71E+00Standard Deviation of Ln9.04E-01	
Bi:Root	Root plant concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt roots p pCi/kg soil)	
Default value used	1	Mean of Ln(X)-5.30E+00Standard Deviation of Ln9.04E-01	
Po:Root	Root plant concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt roots pe pCi/kg soil)	
Default value used	1	Mean of Ln(X)-7.82E+00Standard Deviation of Ln9.04E-01	
Rn:Root	Root plant concentration factor for Rn	CONSTANT(pCi/kg dry-wt roots per pCi/kg soil)	
Default value used	1	<u>Value</u> 0.00E+00	
Ra:Root	Root plant concentration factor for Ra	LOGNORMAL-N(pCi/kg dry-wt roots pe pCi/kg soil)	
Default value used	1	$\frac{\text{Mean of } \text{Ln}(X)}{\text{Constant of } 100000000000000000000000000000000000$	
		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	<u>1</u>	Mean of Ln(X)-4.71E+00Standard Deviation of Ln9.04E-01	
Bi:Fruit	Fruit concentration factor for Bi	Standard Deviation of Ln 9.04E-01 LOGNORMAL-N(pCi/kg dry-wt fruit pepci/kg soil)	
Default value used	I	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 pe pCi/kg soil)	
Default value used	1	Mean of Ln(X)-7.82E+00Standard Deviation of Ln9.04E-01	
Rn:Fruit	Fruit concentration factor for Rn	CONSTANT(pCi/kg dry-wt fruit per pCi/kg soil)	
Default value used	1	<u>Value</u> 0.00E+00	
Ra:Fruit	Fruit concentration factor for Ra	LOGNORMAL-N(pCi/kg dry-wt fruit pe pCi/kg soil)	
Default value used	1	Mean of Ln(X)-6.50E+00Standard Deviation of Ln9.04E-01	
Pb:Grain	Grain concentration factor for Pb	LOGNORMAL-N(pCi/kg dry-wt grain po pCi/kg soil)	
Default value used	1	Mean of Ln(X)-4.71E+00Standard Deviation of Ln9.04E-01	
Bi:Grain	Grain concentration factor for Bi	LOGNORMAL-N(pCi/kg dry-wt grain po pCi/kg soil)	
Default value used	1	Mean of Ln(X)-5.30E+00Standard Deviation of Ln9.04E-01	
Po:Grain	Grain concentration factor for Po	LOGNORMAL-N(pCi/kg dry-wt grain po pCi/kg soil)	
Default value used	1	Mean of Ln(X)-7.82E+00Standard Deviation of Ln9.04E-01	
Rn:Grain	Grain concentration factor for Rn	CONSTANT(pCi/kg dry-wt grain per pCi/kg soil)	
Default value used	1	<u>Value</u> 0.00E+00	
Ra:Grain	Grain concentration factor for Ra		

		LOGNORMAL-N(pCi/kg dry-wt grain p pCi/kg soil)
Default value used		Mean of Ln(X)-6.50E+00Standard Deviation of Ln9.04E-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	Π	Value 0.00E+00
Ra:Poultry	Poultry transfer factor for Ra	CONSTANT(d/kg)
Default value used	1	Value 3.00E-02
	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	L	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/I water)

Default value used		<u>Value</u> 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

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- 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	Concentration	Area (m2)	Calculated	Notes
soil	(pCi/gm)		Annual TEDE	
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 <u>actual</u> soil concentration, post remediation, and its calculated dose for Ra-226 and Ra-226+C. Area value is the actual remediated area in m². Refer to 5.c below.

Contaminant in	Concentration	Area (m2)	Calculated	Notes
soil	(pCi/gm)		Annual TEDE	
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 m².

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	



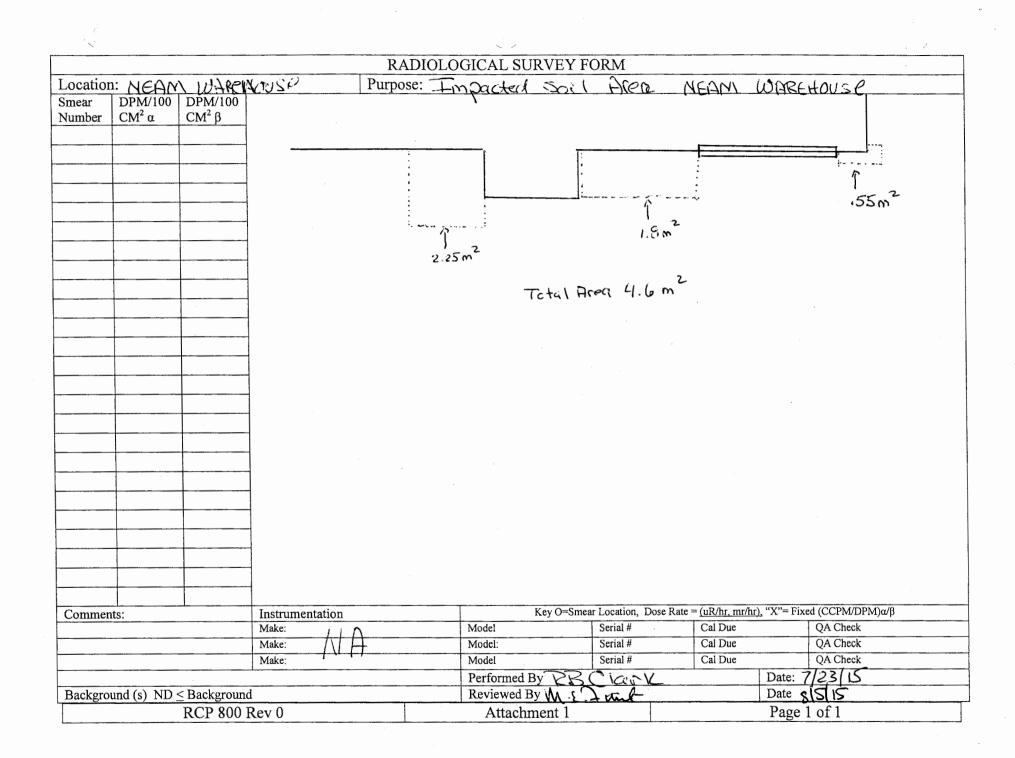
-					RADIO	DLOGICAI	SURVEY	FORM			
Location	I: NEDA	1 lince	MISP						Samples		
Smear Number	DPM/100 CM ² α	<u>Δματε</u> DPM/100 CM ² β			-	-1 ^{D00}			Overhad dor		
				IC	20		3C	40 '-		' SC	
:								•			•
Commen			Instrumentation		•		Key O=S		ose Rate = (uR/hr, mr/hr)	."X"= Fixe	
Compo	site Sam	ples	Make:			Model		Serial #	Cal Due		QA Check
from	gach 10	cation	Make: Make:			Model: Model		Serial # Serial #	Cal Due Cal Due		QA Check QA Check
Dealer	und (a) NID	Background	1			Perform Review	ned By J.	Place		Date: Date	2 15
Dackgro	$ma(s)$ $mD \leq$										of 1
		RCP 800 I	Kev U			Att	achment 1			Page 1	

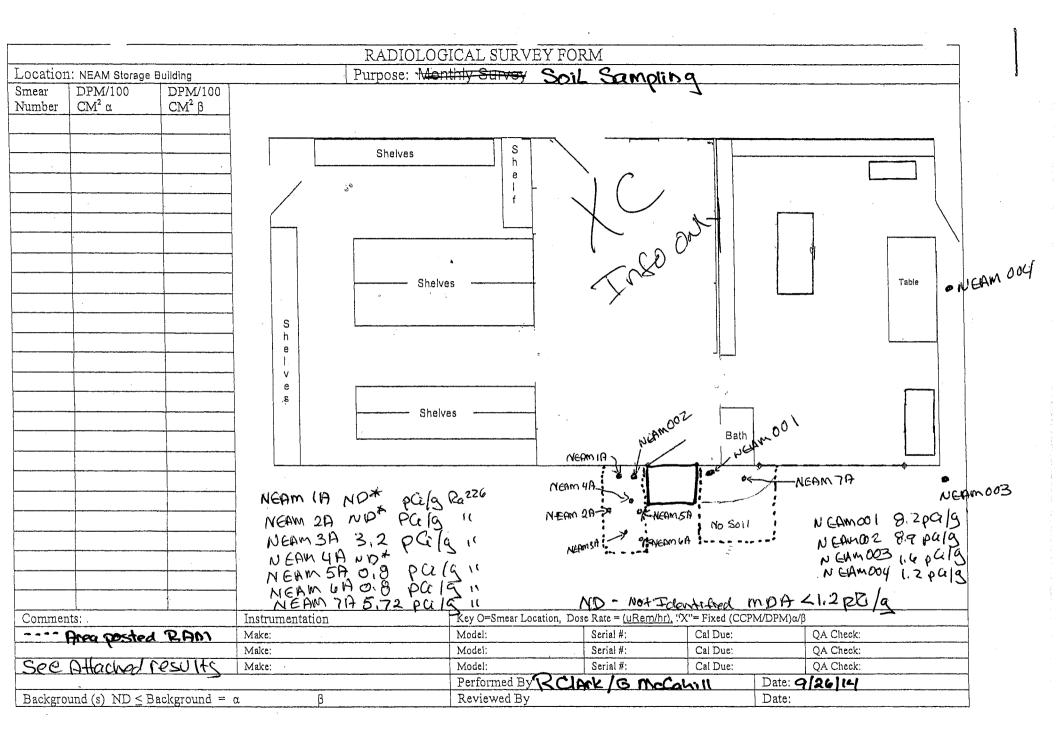
Sample	Reported Value	Background	Net
#	(pCi/gm)	(pCi/gm)	Value(pCi/gm)
1C	1.42	1.0	.42
2C	2.35	1.0	1.35
3C	3.36	1.0	2.36
4C	1.23	1.0	.23
5C	1.53	1.0	.53

Post Remediation Soil Sample Results

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Highest reported value: 2.36 pCi/gm





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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 ____ of ___ -

Project Name: N	FAM	De	EP Projec-	Ĺ		Sample	Туре		Contain		Remarks
Samplers Signature:	BBC	Dal		、	Comp	osite	Gra	ab	Contain	er	remains
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid			
	7/2/15	1310	NGAM IC			Х			500 ML N	Manuel	: DRY Soil
	7/2/15	(325	NEAM 2C			\times					
	7/2/15	1340	NEAM 3C			\times					
	7/2/15	1355	NEAM 4C			×					
	7/2/15	1440	NEAM SC			\prec			V		
	\leq										
Relinquished by:	Date: 8/13/15	Time: 11:00	Received by:			Relinquis	hed by:	.	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	DEEP Shipping Received by:	Under Sea		Relinquis	hed 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

Page____of____-

Project Name: N	FAM	De	EEP Project	۰. ا		Sample	Туре			
Samplers Signature:	JB87	Doel			Comp	osité	Ĝra	b	Container	. Remarks
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid		
ų	7/2/15	1310	NGAM IC			Х			500 Mi manuali	DRY Soil
Š	7[2/15	(325	NEAM 2C			\times				
6	7/2/15	1340	NEAM 3C			×				
7	7/2/15	1355	NEAM 4C			×				
8	7/2/15	1440	NEAM SC			\prec				
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Relinquished by:	Date:	Time: LL:OC	Received by:	An Er 1		Relinquis	-		Date: Time:	Received by: Knisten Coulston
Relinquished by:	Date:	Time:	DEEP Shipping Received by:	Under Sea		UPS Relinquis			5 18 15 1400 Date: Time:	Received by:

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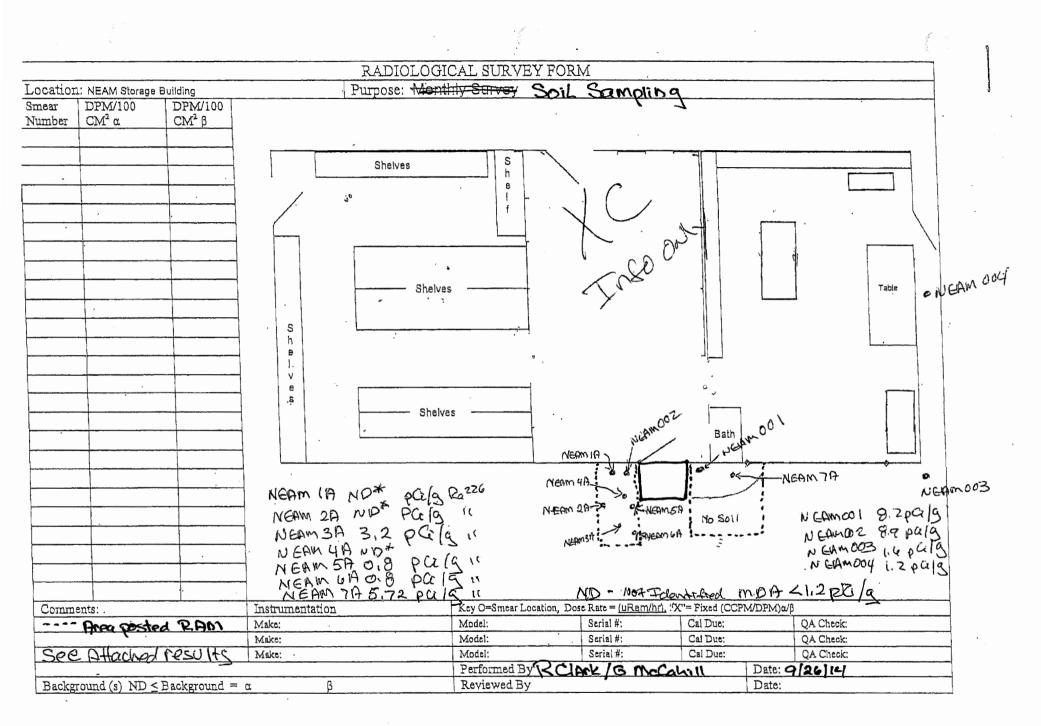
	Client Name	Contract/F	0	Project Type			•••••••••••••••••••••••••••••••••••••••		eceive				ļ	R	quire		-	nd Da	ys								Order	
Ct Dept	of Energy & Env Protection	DEPM1-00000	39273	Environmental		0	8/	18	/2	01	5			30 15-080								6						
	Project Name	Client Wo	2	Sample Disp					eadlin							- • •	· · · ·				Client Deadline 09/17/2015							
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Internal ID	Client ID	Sample Date	Matrix	Storage	Gamma																							II
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02	BLANK	08/18/15	SO	G1.0	x																			1				1
03	DUP	08/18/15	SO	G1.0	x								1	-														1
04	NEAM 1C	07/02/15 13:10	,so	G1.0	x																			1				1
05	NEAM 2C	07/02/15 13:25	so	G1.0	x											-												1
06	NEAM 3C	07/02/15 13:40	50	G1.0	x																-							1
07	NEAM 4C	07/02/15 13:55	50	G1.0	x												-											1
08	NEAM 5C	07/02/15 14:40	\$0·	G1.0	X											Į												1
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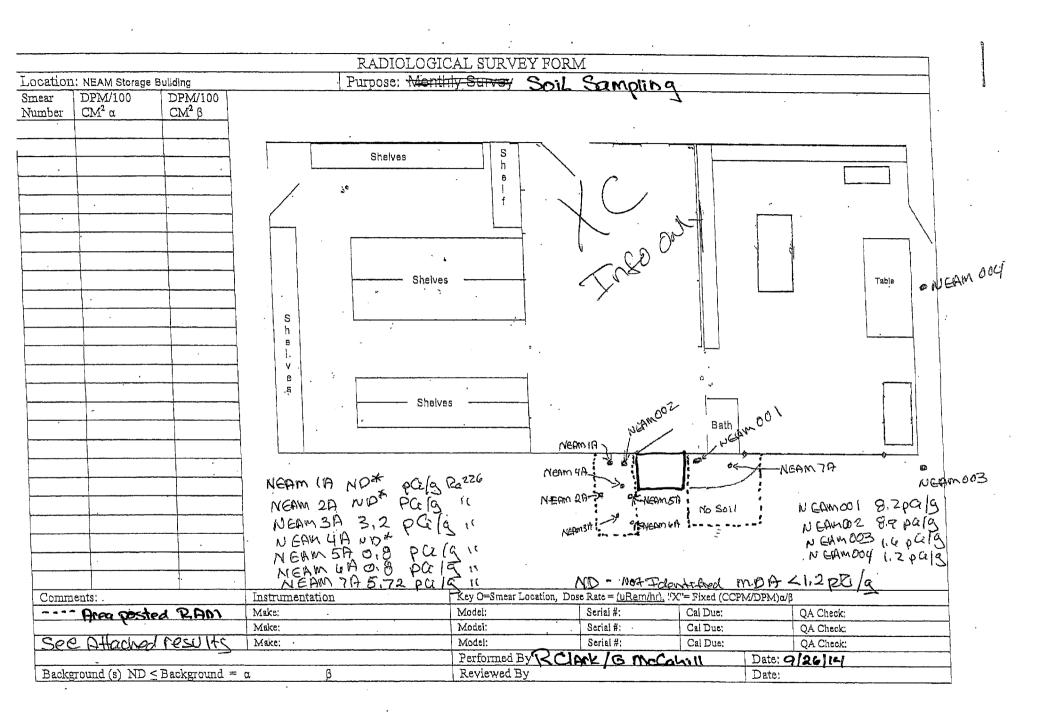


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Department of Energy & Environmental Protection Bureau of Air Management Division of Radiation 79 Elm Street Hartford, CT 06106-5127 860) 424-3029

Page _____ of ____ -

Project Name: N	FAM	DE	EP Project	^		Sample	Туре		Container		Remarks
Samplers Signature:	PBEC	Dal	0	`	Comp	osite	Gra	b	Container		Kenigha
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid	-		•
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Department of Energy & Environmental Protection Bureau of Air Management Division of Radiation 79 Elm Street Hartford, CT D6106-5127 (860) 424-3029

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REC'D AUG 1,8 2015

Page_____of____-

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Project Name: N	EAM	De	EP Project	f		Sample	Туре			Demote
Samplers Signature:	PBFC)oel			Comp	osite	Gra	b	Container	Remarks
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid		
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7	7/2/15	1355	NEAM 4C			×				
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Relinquished by:	Date:	Time:	Received by:	3 Union Sec	-\		s uished by:		Date: Time:	Received by:

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D	Project Name DEPM1-0000039273	Client WO		Sample Disp H		0			adiine /2(5			0) 20	-	5			i		Client	Dead			
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04	NEAM 1C	07/02/15 13:10	,so	G1.0	x								1															1
05	NEAM 2C	07/02/15 13:25	so	G1.0	X			1											-									1
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Nap.

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.

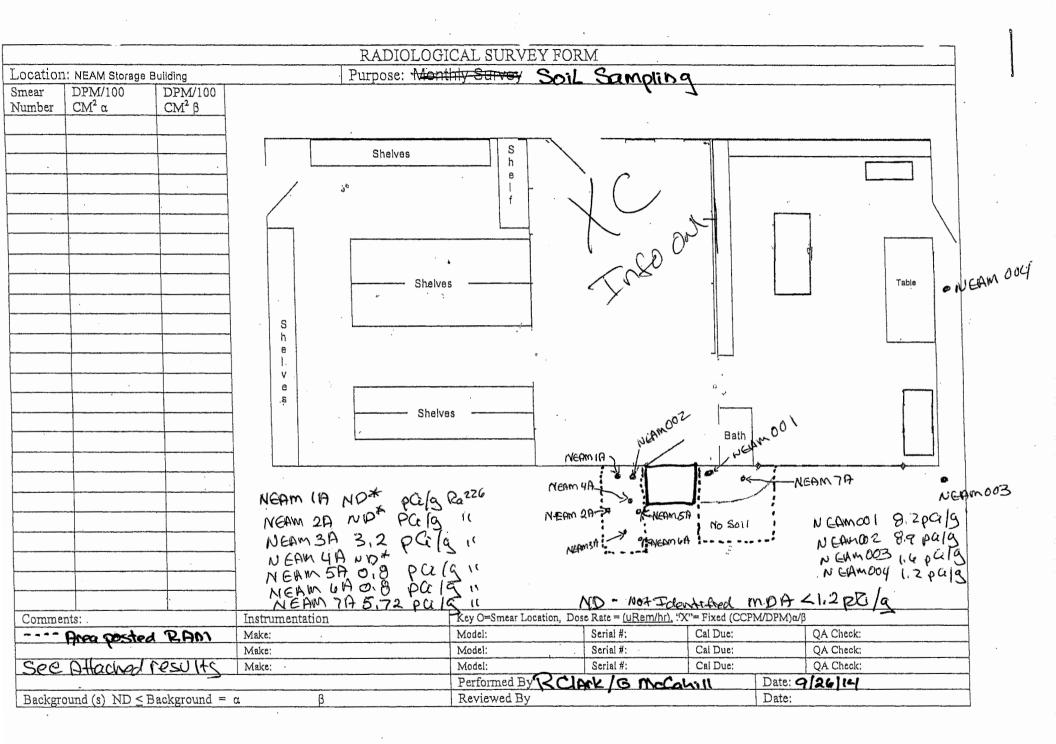
Attn: Mike Firsick

Division of Radiation Department of Energy & Environmental Protection 79 Elm Street Hartford, CT 06106

Thank you.

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Bob Clark



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August 13, 2015

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Bob Clark

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				ΡΑΓ		HCAL SURVEY	TOPM				T (81)
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from	oach le	indes	Make:			Model:	Serial #	Cal Due		QA Check	
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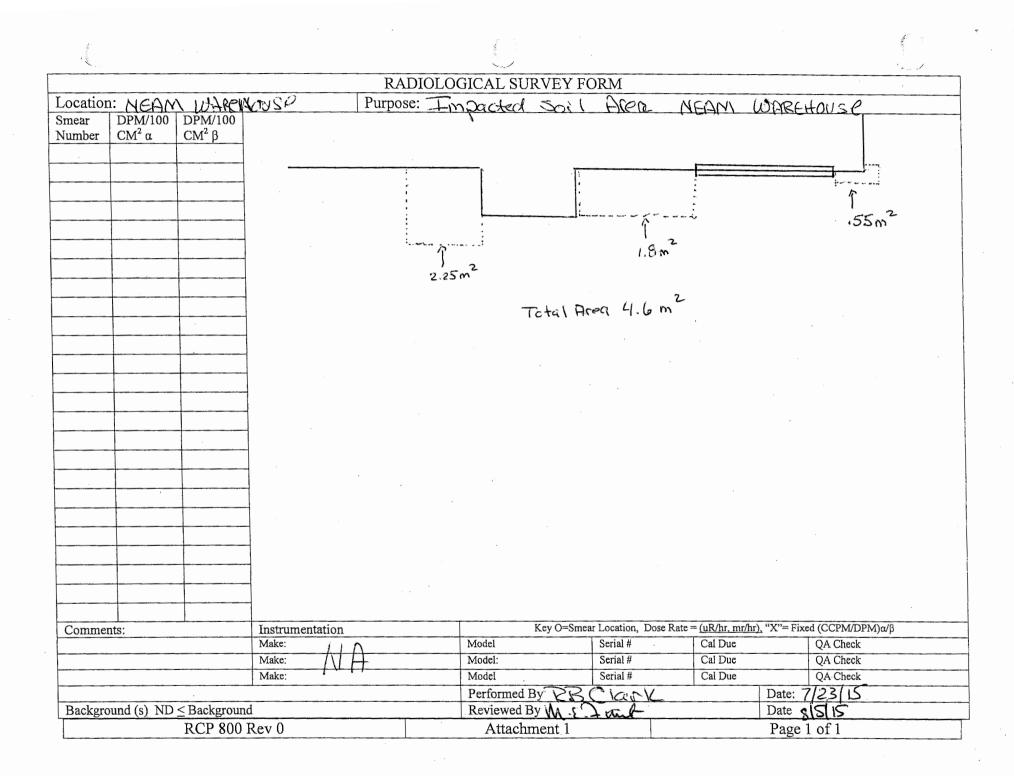
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Sample	Reported Value	Background	Net
#	(pCi/gm)	(pCi/gm)	Value(pCi/gm)
1C	1.42	1.0	.42
2C	2.35	1.0	1.35
3C	3.36	1.0	2.36
4C	1.23	1.0	.23
5C	1.53	1.0	.53

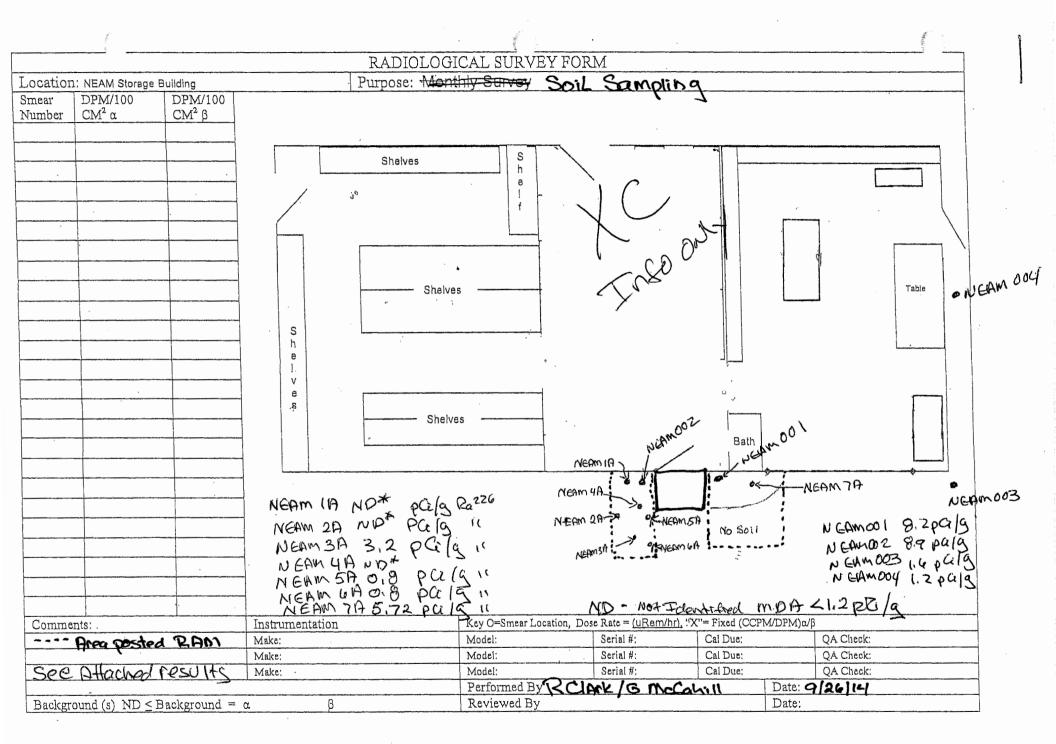
Post Remediation Soil Sample Results

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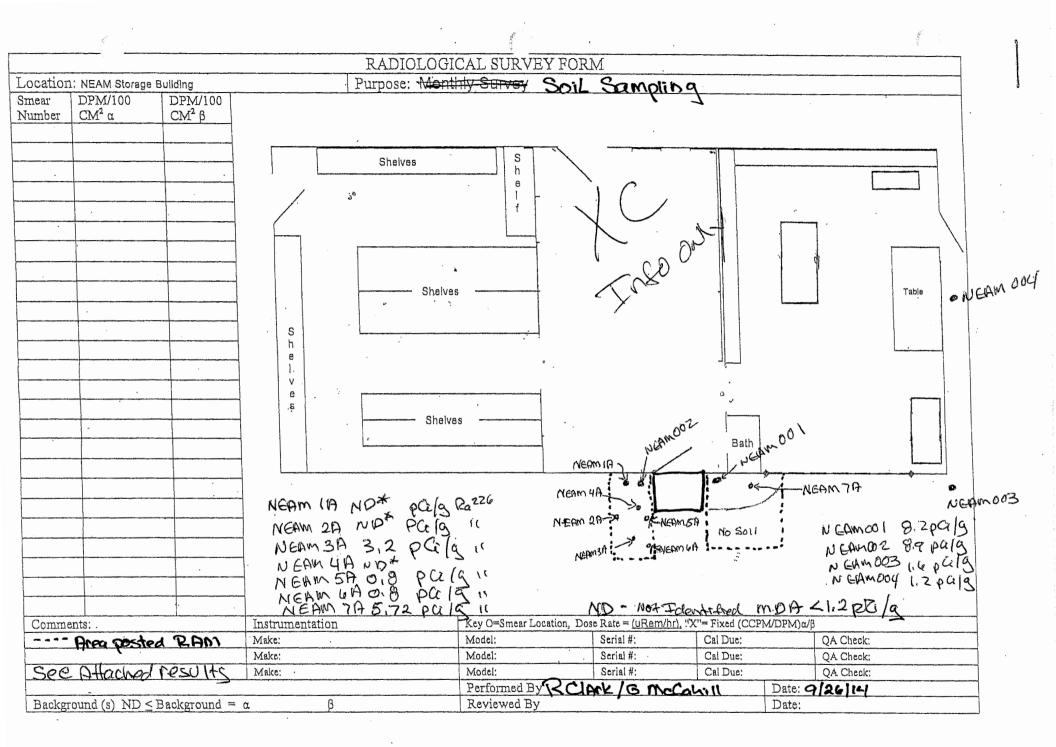
Highest reported value: 2.36 pCi/gm





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Pepartment of Energy & Environmental Protection Bureau of Air Management Division of Radiation 9 Elm Street Hartford, CT 06106-5127 860) 424-3029

Page _____ of ____ -

Project Name:	FAM	De	EP Project	<u> </u>		Sample	Туре		Containe		Remarks
Samplers Signature:	PBR	Dal	2		Comp	osite	Gra	ıb	Containe	51	Nellarko
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid	-		•
	7/2/15	1310	NGAM IC			X			500 ML M	anuili	DRY Soil
	7/2/15	(325	NEAM 2C	·	,	\times					
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15-08076

REC'D AUG 1,8 2015

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

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Page____of___-

Project Name: N	FAM	D	EEP Project	ρ 		Sample	Туре		0	
Samplers Signature:	JB87	Doel			Comp	osite	Gra	ıb	Container	Remarks
Laboratory Number	Date	Time	Sample Number	Sample Location	Liquid	Solid	Liquid	Solid	-	
ų	7/2/15	1310	NGAM IC			Х			500 ML Manual	1 DRY Soil
Š	7/2/15	(325	NEAM 2C.			\times				· · · ·
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Internal ID	Client ID	Sample Date	Matrix	Storage	Gamma																					Ĩ			TI
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	50	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.	50	G1.0	x								+			_													1
06	NEAM 3C	07/02/15 13:40	50	G1.0	x																								1
07	NEAM 4C	07/02/15 13:55	50	G1.0	x						·								_				•						1
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15-08076

August 13, 2015

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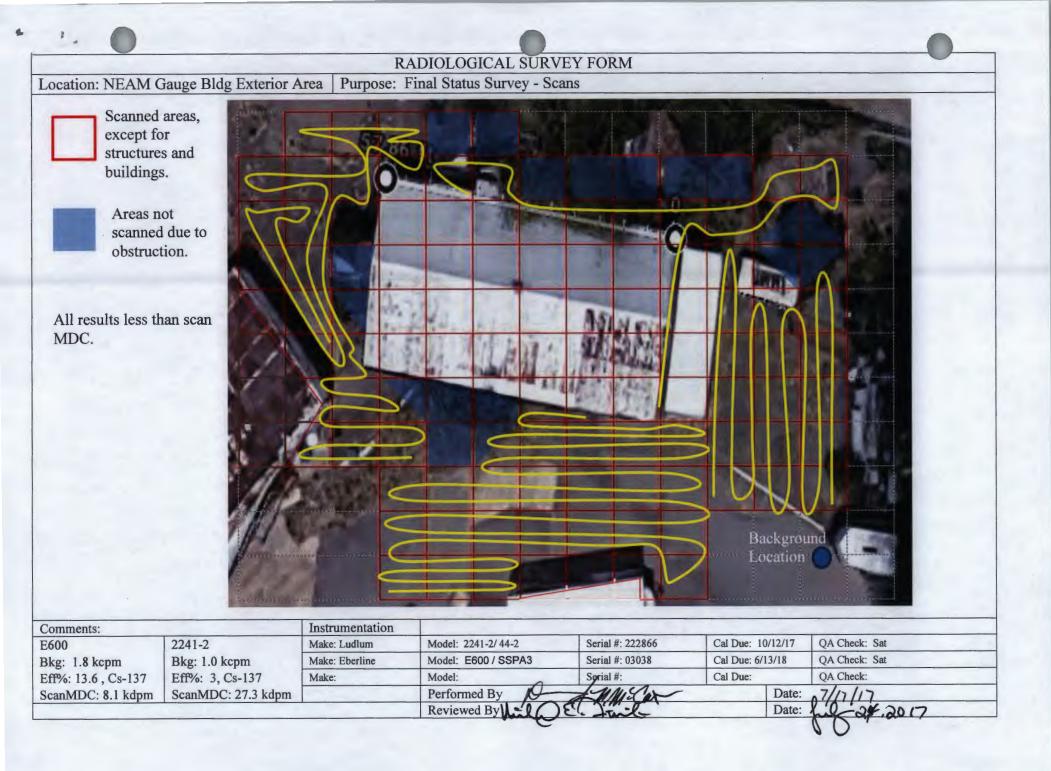
Thank you.

Bal

Bob Clark

ATTACHMENT 8

Survey Results - Aircraft Stored Outside



Background Count Determination

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

legacy and 64 Bit)	
RAD PRO CALC INITY B & PU GRAMS CON FRESHER Select Frisker Type - C Apha or Beta C Garma Select MEC Linits	
dym y	Lower Limit of Detection (LLD) 820 gpm Minimum Detectable Contamination (MOC) 27333 dpm Calculate Exit
	RAD PRO CALC INTY B.B. PS GRAMS CON FRISTER Select Frisker Type C Apris or Bets C Apris or Bets C Gamma Select MEC Units

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Eberline E600 Scan MDC

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Rad Pro Calculator Version 3.26	(Legacy and 64 Bit)	
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