NRC LICENSE TERMINATION PLANNING AT THE SENECA ARMY DEPOT ROMULUS, NEW YORK

by

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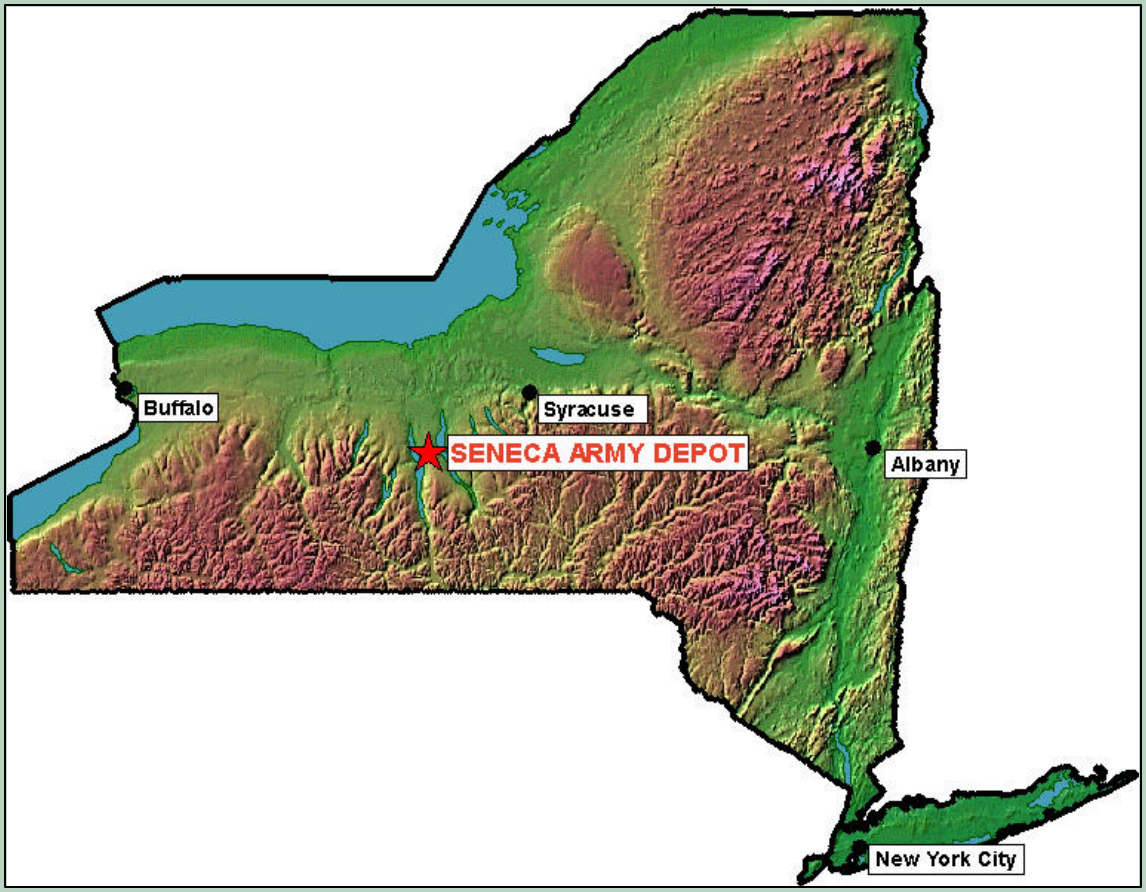
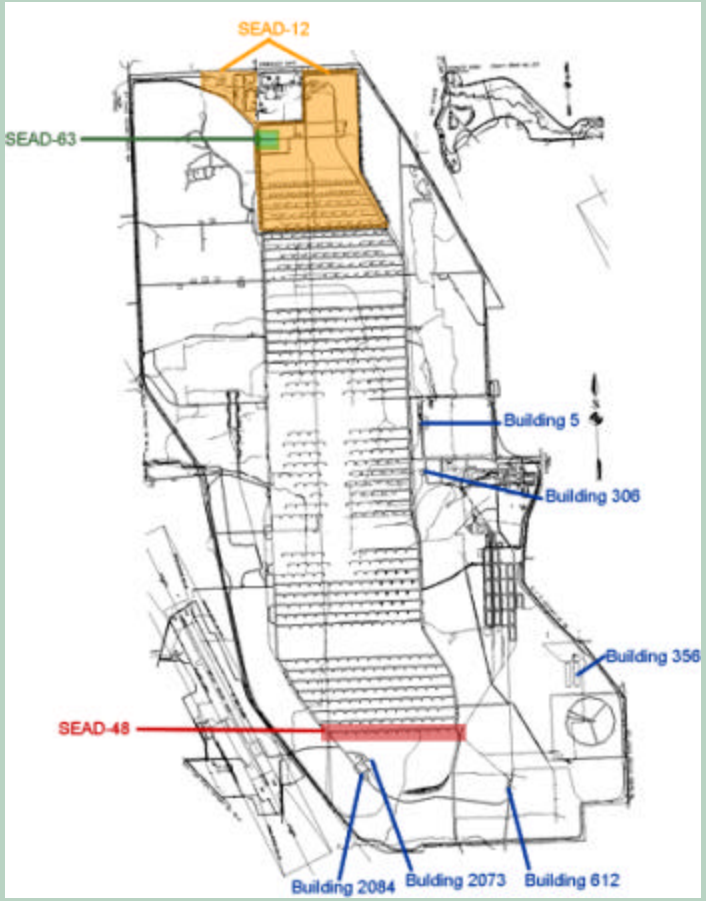
Seneca Army Depot (SEAD)

- 10,500 Acre Site near Romulus, NY
- Stored DU munitions
- BRAC Site - September 1995
- Closed Operations - July 2001
- Ongoing cleanup and NRC license termination



Seneca Army Depot
Site Map



Participating Organizations

- U.S. Army Operations Support Command
  - Overall command and direction
  - BRAC Environmental Coordinator
  - Base Transition Coordinator
- New York District Corps of Engineers
  - On-Site Project Management
- U.S. Army Engineering and Support Center, Huntsville
  - Technical management of study contracts
- Parsons Engineering, Inc.
  - CERLA documentation and NRC license termination surveys
- Argonne National Laboratory
  - Independent technical review and support

NRC Licenses for DU Munitions

- SUC 1275 for DU Munitions
  - 30 mm cartridges
- SUC 1380
  - 25, 105, and 120 mm cartridges
- 45-16023-01NA
  - 20 and 25 mm cartridges
- SUB-834
  - 7.62 mm and 0.50 caliber cartridges

License Termination/Closeout

- Material License
  - receive, acquire, possess and transfer
    - by-product, source or special nuclear material
- Expires February 2005
- Decommissioning Plan not required
  - no exposures or releases expected
- License Termination Plan
  - 10 CFR 20 Subpart E dose criterion

License Termination Plan (LTP)

- May 2000 - Draft LTP to NRC
  - July 2000 - major comments received
- November 2000 - NRC Meeting
  - SEAD, ANL, Parsons
- April 2001 - Expanded Draft LTP
  - August 2001 - Revised Draft
  - February 2002 - Further DCGL revisions
- June 2002 - LTP approval expected

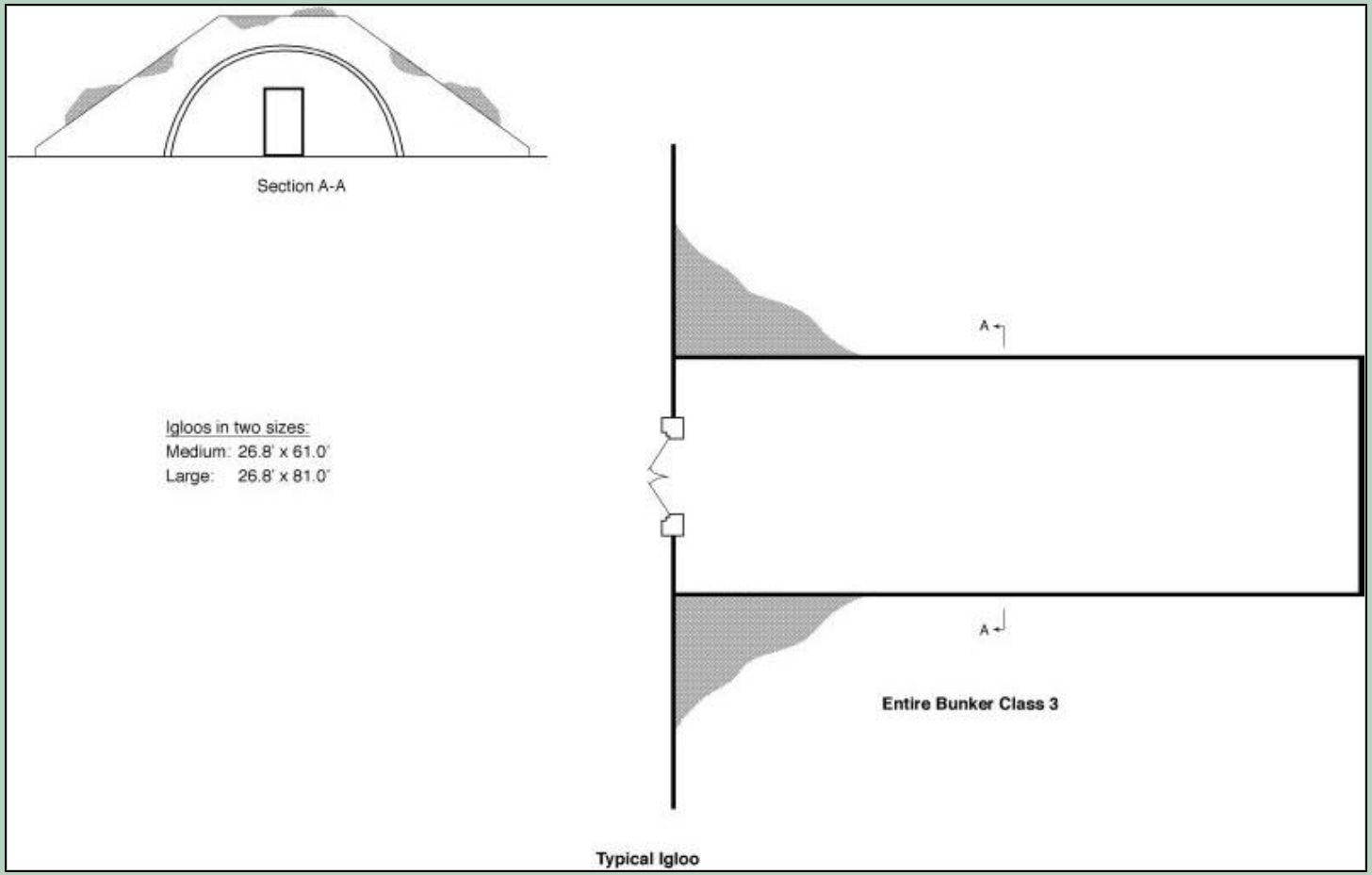
LTP Elements

- Facility History Review
- Radionuclides of Interest
- Development of DCGLs
  - 25 mRem/yr Dose Criterion
  - RESRAD, RESRAD-BUILD
- Final Status Survey Design
  - MARSSIM

Facilities, Materials and Isotopes

Buildings	Materials and Operations	Radionuclides of Interest
612	Inspect DU munitions	U-234, U-235, U-238 (DU)
5, 306, S-2084, 2073	Stage munitions for shipment	U-234, U-235, U-238 (DU)
4 Special Weapons Bunkers	Storage of Special Weapons	Pu-239, H-3, DU
Warehouse 356	Columbite and Tantalum Ore Storage	Natural Thorium
120 Ammunition Bunkers	Storage of Packaged DU munitions	U-234, U-235, U-238 (DU)

Bunker Schematic



D-Block - Original Apron

E0804 Front View

E-0804 Exterior Drain

Storage Bunker Roof Vent

Soil $DCGL_w$'s for the Residential Scenario

Radionuclide	Wide-Area DCGLs (pCi/g)
H-3	1.83E+03
Pm-147	8.54E+04
Pu-239	5.61E+01
Ra-226	3.43E-01
Ra-228	1.88
Th-228	2.44
Th-232	1.14
U-234	2.64E+02
U-235	2.26E+01
U-238	1.03E+02

Building Surface $DCGL_w$'s

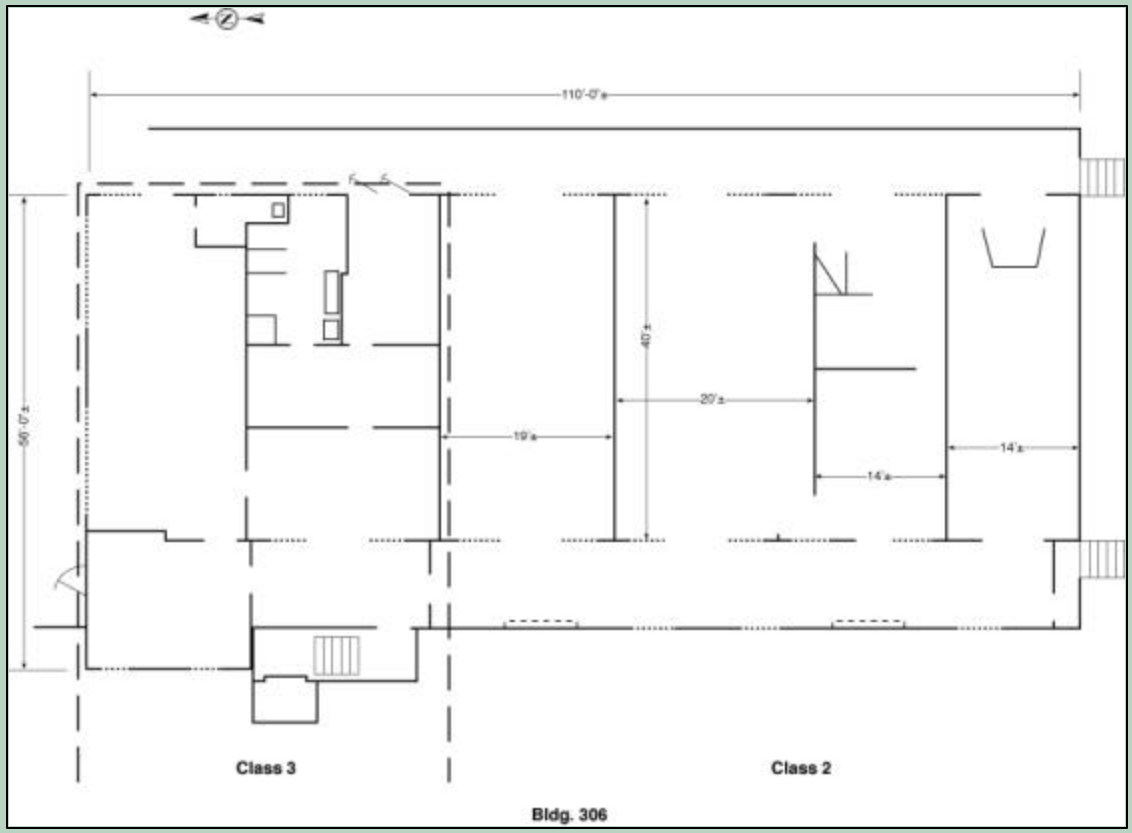
(dpm/100 cm^2) at a Dose Limit of 10 mrem/yr for the Building Occupancy Scenario

	Guideline Levels for Different Room Areas, Room Height = 2.5 m				
Radionuclide[a]	**10 m^2**	**36 m^2**	**200 m^2**	**600 m^2**	**2,000 m^2**
H-3	3.58E+09	3.58E+09	3.58E+09	3.58E+09	3.58E+09
Pm-147	4.27E+07	4.11E+07	3.83E+07	3.70E+07	3.47E+07
Pb-210	2.13E+04	2.22E+04	2.22E+04	2.02E+04	2.02E+04
Ra-226	8.88E+03	5.84E+03	3.83E+03	3.13E+03	2.61E+03
Ra-226+Pb-210	6.27E+03	4.63E+03	3.26E+03	2.71E+03	2.31E+03
Ra-228	6.73E+03	5.41E+03	4.11E+03	3.52E+03	3.08E+03
Th-228	1.85E+03	1.71E+03	1.59E+03	1.48E+03	1.39E+03
Th-232	5.29E+02	5.29E+02	5.29E+02	5.29E+02	5.29E+02
Th-232+Ra-228+Th-228	3.87E+02	3.76E+02	3.62E+02	3.51E+02	3.40E+02
U-234	6.53E+03	6.53E+03	6.53E+03	6.53E+03	6.53E+03
U-235	6.73E+03	6.53E+03	6.17E+03	6.00E+03	5.69E+03
U-238	7.16E+03	7.16E+03	7.16E+03	7.16E+03	6.94E+03
Pu-239	2.02E+03	2.02E+03	2.02E+03	2.02E+03	2.02E+03

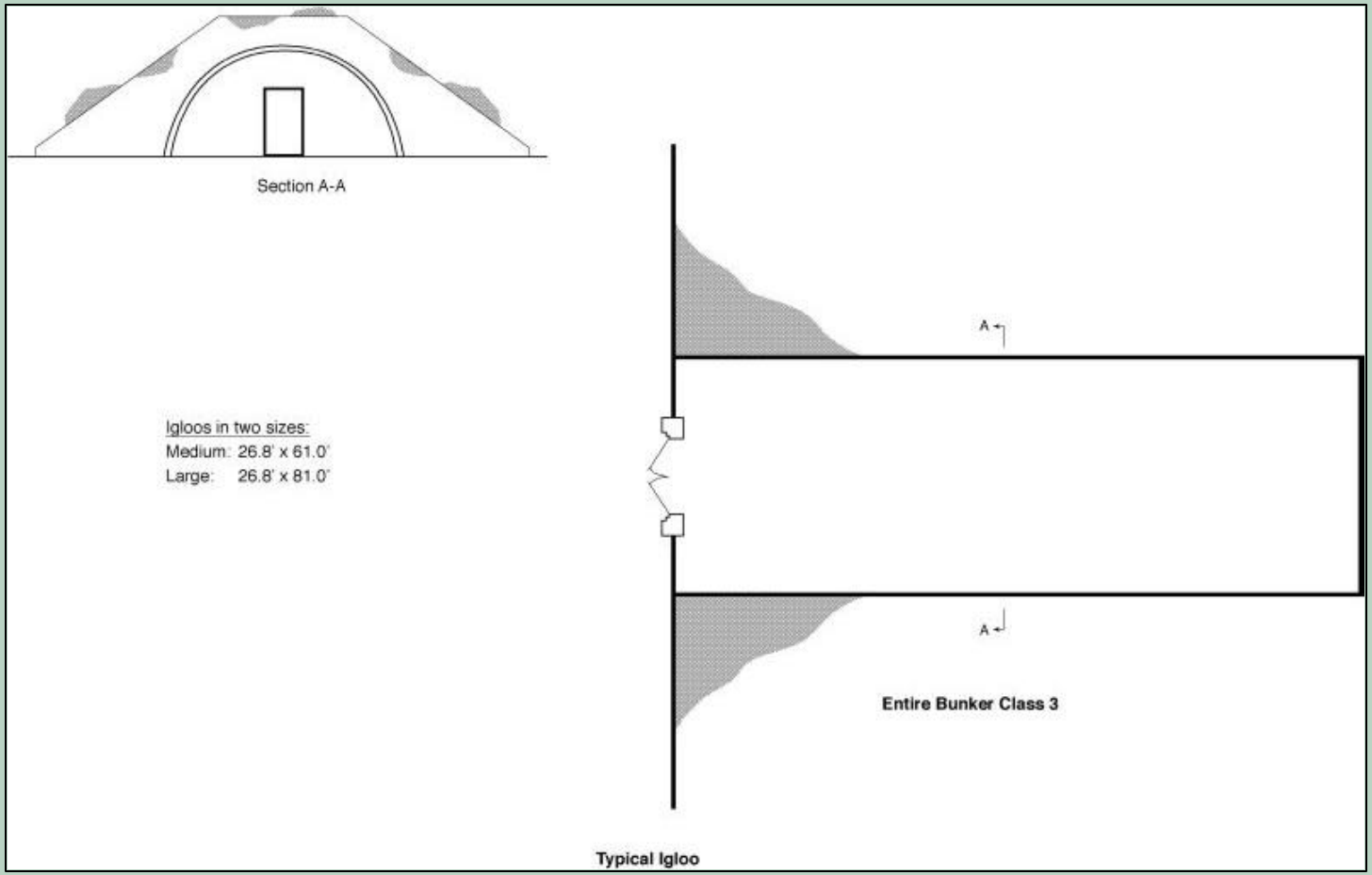
MARSSIM SURVEY UNIT CLASSIFICATIONS

- Class 1
  - known or likely contamination above DCGL
  - up to 100 m^2 (2000 m^2 for land areas)
- Class2
  - some expected, but below DCGL
  - up to 1000 m^2 (10,000 m^2 for land areas)
- Class 3
  - potentially impacted
  - no size limit

Building 306 Survey Areas



Storage Bunker is a Single Survey Unit



Summary of Building Survey Units

Building No.	Total floor area (m^2)	No. Survey Units/Size (m^2)		
		Class 1	Class 2	Class 3
5	1092	0	7 (1000 total)	1 (92)
306	536	0	7 (312 total)	1 (224)
356	18,600	0	0	5 (3720 ea.)
612	1,730	28 (3-250, completed)	0	0
2073	280	0	3 (280 total)	0
S-2084	510	0	4 (510 total)	0
Storage Bunkers (121 total)	150 (20-m length) 200 (25-m length)	0	0	93 (150 ea.) 28 (200 ea.)

Background Readings in Reference Bunker C0912

Instrument	Floor or Wall (Bunker C0912)	Background Range (counts per minute, cpm)
Gas Proportional – Floor Monitor (probe area = 425 cm^2)	Floor- Alpha Floor –Beta Floor – Alpha + Beta (scanning)	3-8 650-757 400-800
Gas Proportional – Hand-Held (probe area = 100 cm^2)	Wall – Alpha Wall- Beta Wall – Alpha + Beta (scanning) Floor – Alpha + Beta (scanning)	0-5 (0 for smears) 121-166 (0 for smears) 60-200 60-200
Phoswich (plastic scintillator, probe area = 86 cm^2)	Floor – Alpha Floor – Beta Wall – Alpha Wall – Beta Floor – Alpha + Beta (scanning) Wall - Alpha + Beta (scanning)	0-3 270-326 0-6 216-411 200-400 200-460
FIDLER (sodium iodide crystal, probe area = 126 cm^2)	Floor – Gamma (direct) Wall – Gamma (direct) Floor – Gamma (scanning) Wall – Gamma (scanning)	7,849-8,219 7,583-8,136 6,000-12,000 5,800-10,500

Final Status Survey (FSS) Design - Measurement Types

- Scanning (floor monitor, hand-held)
- Direct (floor monitor, hand-held)
- Smears (field screen, off-site analysis)
- Ducts and Drains (material samples)
- Outdoor Gamma Surveys (FIDLER)

FSS Design Survey Requirements

- Class 1 SUs
  - 100 % Scan All Surfaces
  - Grid Sampling
- Class 2 SUs
  - 10 to 100% Scan of Surfaces
  - Grid Sampling
- Class 3 SUs
  - Biased Scanning
  - Random direct measurements

FSS Design
Number of Random Samples

- Class 1 and 2 SUs
  - Hotspot considerations (Class 1)
  - MARSSIM
- Class 3 SUs
  - BRAC Policy
    - 30 random samples
    - Up to 1500 m2
    - Biased sampling, e.g., Ducts, Drains

FSS Design N/2 for WRS

Bldg. No.	Limiting[1] radio-nuclide	Operational[2] $DCGL_w$ (dpm/100 cm^2)	LBGR[3] (dpm/100 cm^2)	CV[4]	Relative[5] Shift	α[6]	β[7]	N/2 for[8] WRS test
5 306 612 2073 S-2084 Storage Bunkers	U-235	5690	500 (alpha)	0.3	35	0.05	0.10	6
356	Th232+ Ra-228+ Th-228	340	200 (alpha)	0.3	2.3	0.05	0.10	7
A0201 A0316 A0317 A0508	Pu-239 H-3	2020 3.58E+09	200 (alpha) 3xE+05 (beta)	0.3 0.3	30 3.9E+4	0.05 0.05	0.10 0.10	6 6
A0701	Pm-147	3.47E+07	3E+04 (beta)	0.3	3850	0.05	0.10	6

FSS Design
Outdoor Surveys

- No Formal Survey Units
- FIDLER Surveys only
  - Biased locations
  - Scanning and Direct
- Investigate any hits
- No *a priori* soil samples

FSS Design
Operational DCGLs

- For evaluation of field measurements
  - gross cpm -vs- nuclide-specific dpm
- Select limiting nuclide
  - DCGL table
- Select limiting room size
  - usually the smallest room
- Apply instrument efficiency

Floor Monitor

Hand-Held Gas Proportional Counter

Phoswich

FIDLER

Minimal Detectable Activity (MDA)

Instrument[b]	Model	Serial No.	Probe Area (cm^2)	Rad Type	Source	Eff	Bkg (cpm)	Scan MDA dpm/100 cm^2)	Static MDA (dpm/100 cm^2)
Floor monitor	Ludlum 2360	138256	425	Alpha	Th-230	0.12	2	60	20
Floor monitor	Ludlum 2360	138256	425	Beta	Tc-99	0.22	800	610	140
Floor monitor	Ludlum 2360	138262	425	Alpha	Th-230	0.09	1	50	20
Floor monitor	Ludlum 2360	138262	425	Beta	Tc-99	0.20	440	500	120
Hand-held	Ludlum 2360	138238	100	Alpha	Th-230	0.18	1	110	40
Hand-held	Ludlum 2360	138238	100	Beta	Tc-99	0.20	73	870	280
Hand-held	Ludlum 2360	138254	100	Alpha	Th-230	0.20	1	100	40
Hand-held	Ludlum 2360	138254	100	Beta	Tc-99	0.21	81	870	210
FIDLER[c]	Bicron Analyst	A959P	126	Gamma	Am-241	0.02	6500	65,000	15,000

Data Analysis

- Wilcoxen Rank Sum (WRS) Test
  - Comparison to reference area
- Sign Test
  - Radionuclide not present in background, or
  - Action levels well above background

Recommendations

- Make the most of historical site data
- Work closely with NRC (and others)
- Get early agreement on modeling inputs
- Consider seasonal limitations
- Communicate with survey contractor

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