Beverly, Massachusetts, Site

U.S. DEPARTMENT OF ENERGY | Legacy Management

SITE CERTIFICATION SUMMARY

This Site Certification Summary provides information about the **Beverly, Massachusetts, Site**. The U.S. Department of Energy Office of Legacy Management is responsible for long-term stewardship of the site under the **Formerly Utilized Sites Remedial Action Program**.

Site Description and History

The Beverly, Massachusetts, Site (formerly known as the Ventron Corporation Site) is located on Massachusetts Bay at the confluence of the Bass and Danvers rivers. From 1942 to 1948, the Metal Hydrides Corporation (predecessor of the Ventron Corporation) used the 3-acre site to process natural uranium under contract to the Manhattan Engineer District (MED). In 1977, Thiokol Corporation acquired the property. Prior to remedial action, the site was a fully operational chemical-manufacturing facility comprised of three groups of buildings: the A buildings (used for uranium storage and processing), the B buildings (constructed over the machine shop used during MED operations), and C buildings (next to subsurface waste pits). Other on-site buildings (Biocides Building and Buildings E, F, and J) were not used for MED activities; however, some private operations involving purification of thorium were conducted in Building J. Building F was built on the site of a former MED operations building.

Site Remediation Timeline

1977, 1980 through 1982 — Oak Ridge National Laboratory (ORNL) conducted radiological surveys of the land and buildings.

1986 — The Beverly site was designated for inclusion in the Formerly Utilized Sites Remedial Action Program (FUSRAP).

1987 through 1988 — ORNL performed additional radiological surveys.

1990 — The Ventron Corporation was renamed Morton International.

1991 — Radiological surveys of properties in the vicinity of the site were performed to determine if radiological contamination from plant operations had migrated off-site.

1992 — Betchtel National Inc. performed further characterization of radiological and chemical conditions at the site.

1994 — Morton International production activity at the site ceased.

September 1995 — The first phase of remediation occurred at the site.

1996 — U.S. Department of Energy (DOE) and Morton International finalized a Memorandum of Agreement regarding the allocation of cleanup responsibilities between the parties.

May 1996 through March 1997 — The second phase of remediation occurred at the site.

July 1997 — Supplemental sampling of the site occurred to verify the adequacy of radiological remediation.

1997 — DOE radiological decontamination of the site concluded.

October 21, 2003 — DOE published a notice of cleanup certification for the site in the Federal Register.

Certification Docket Contents

The Certification Docket documents the successful decontamination of radioactively contaminated areas at the Ventron Corporation Site in Beverly, Massachusetts, by DOE. The docket includes information and documents supporting certification that conditions at the property are in compliance with radiological guidelines in effect at the conclusion of remedial action. In addition, the certification docket substantiates that the future use of the property will not produce any significant radiological hazard or dose to the general public as a result of residual radioactivity remaining on-site that originated during activities conducted by DOE or its predecessor agencies.

Remedial Action

Remedial activities at the Beverly site were performed in two phases as part of the FUSRAP program. The first phase of remediation took place in September 1995; the second phase

took place from May 1996 through March 1997. During these two phases, all but two buildings (the Biocides Building and Building E) were demolished and much of the soil and rubble were excavated. See the Fact Sheet for details.

FUSRAP objectives for the site were to:

- Identify and evaluate areas formerly used to support MED/U.S. Atomic Energy Commission nuclear development activities.
- Remove or otherwise control radioactive contamination above current federal guidelines.
- Achieve and maintain compliance with applicable criteria for the protection of human health and the environment.
- Certify the site, to the extent possible, for use without radiological restrictions after remediation.

Post-Remediation Sampling

DOE conducted walkover scans during remedial action to direct the excavation. As remediation was completed, DOE measured exposure rates to confirm that radiation levels were in compliance with applicable guidelines and collected and analyzed soil samples to establish that residual radioactive material exceeding applicable criteria had been removed. Neither of the two remaining on-site structures was involved in work with radiological materials. However, interior gamma radiation exposure rates were taken in these structures.

Buildings

Before soil excavation began, Morton International demolished Buildings A, B, C, and F and shipped the debris from Buildings B, C, and F to a Class II industrial landfill for disposal. Debris from Building A was crushed, sampled, and stockpiled for use as backfill. Data for the crushed debris indicated that the concentrations of uranium-238 (U-238), thorium-232 (Th-232), and radium-226 (Ra-226) were below supplemental limit criteria. As soil remediation progressed, demolition of Building J became necessary in order to access and remove contaminated soil beneath the building.

Excavations

DOE excavated and verified 11 discrete site areas for compliance with radiological cleanup criteria. See the Site Certification Data Summary Worksheet on pages 4-7 for detailed results.

Other Areas of Remediation

The bank of ovens in Building A exhausted into a tunnel directly beneath the building. The tunnel contained radioactively contaminated material mixed with asbestos. Morton International removed, bagged, packaged, and shipped the asbestos-contaminated material from the tunnel for disposal as low-level radioactive waste.

The seawall at the site is approximately 100 years old, composed primarily of granite boulders stacked 12 feet high. Residual contamination within the seawall could not be remediated due to stability and safety concerns. Estimates indicated that the total uranium concentration in the rubble, 0.72 picocuries per gram (pCi/g), would be less than 1% of the volumetric soil guideline of 100 pCi/g established for the Beverly site. The seawall required no further action.

Supplemental Sampling

Due to concerns about the final radiological status of the Beverly site, additional sampling was performed in July 1997. Seven on-site boreholes and three boreholes in the harbor were drilled and sampled. All sample results were below the cleanup criteria of 50 pCi/g for U-238, 5 pCi/g for Th-232, and 5 pCi/g for Ra-226. This supplemental post-remedial action data addressed concerns about the sufficient data needed to demonstrate site-wide compliance with the cleanup criteria.

For detailed results of the post-remediation sampling, see the Site Certification Data Summary Worksheet. For a detailed map of the site and sampling locations, see the Site Overview Map on page 8.

Current Site Conditions

DOE post-remedial action survey data indicate that the radiological condition of the Beverly site is in compliance with applicable DOE standards and guidelines for cleanup of residual radioactive contamination. DOE certified that use of the property will result in no radiological exposure above current guidelines established to protect the public as well as site occupants. The site was released for unrestricted use.

DOE has been responsible for long-term stewardship of the Beverly site since 2004. The stewardship requirements and protocols are captured in the FUSRAP Long-Term Surveillance and Maintenance Plan, which is available found on the DOE Office of Legacy Management website (www.energy.gov/lm/beverly-massachusetts-site).

ADDITIONAL INFORMATION

Documents related to FUSRAP activities at the Beverly, Massachusetts, Site are available on the LM website at lmpublicsearch.lm.doe.gov/SitePages/default.aspx?sitename=Beverly.

For other information on site history or current long-term stewardship activities, please contact us at:

U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way
Grand Junction, CO 81503

Email:
FUSRAPinfo@lm.doe.gov
public.affairs@lm.doe.gov

DOE Office of Legacy Management
(970) 248-6070

www.energy.gov/lm

www.facebook.com/OfficeofLegacyManagement

www.linkedin.com/showcase/office-of-legacy-management

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Beverly, Massachusetts, Site Certification Data Summary Worksheet

Twelve tables referenced in the Beverly Certification Docket provide the evidence used to certify the site as clean.

When the tables refer to the "PRAR," that is the "Post-Remedial Action Report for the Remedial Action at the Ventron Site, Beverly, Massachusetts" (dated March 2003).

Post-Remedial Action Data, July 1997 Supplemental Sampling

Table 5-1 in the PRAR

Borehole	Sample ID	Depth (ft)	U-238 (pCi/g)	Th-232 (pCi/g)	Ra-226 (pCi/g)
Onsite					
1 (Alfa Building)	127-RS-0800	0 – 1	<2.55	0.6 ± 0.06	0.55 ± 0.04
1 (Alfa Building)	127-RS-0801	1 – 2	4.30 ± 1.36	0.78 ± 0.07	0.64 ± 0.05
1 (Alfa Building)	127-RS-0802	2 – 3	6.61 ± 1.28	0.51 ± 0.06	0.65 ± 0.04
1 (Alfa Building)	127-RS-0803	3 – 4	3.31 ± 1.00	0.65 ± 0.06	0.65 ± 0.04
1 (Alfa Building)	127-RS-0804	4 – 5	1.98 ± 1.06	0.61 ± 0.07	0.65 ± 0.05
1 (Alfa Building)	127-RS-0805	5 – 5.5	2.27 ± 1.13	0.61 ± 0.07	0.51 ± 0.05
2 (Alfa Building)	127-RS-0806	0 – 1	4.15 ± 0.93	0.55 ± 0.06	0.52 ± 0.04
2 (Alfa Building)	127-RS-0807	1 – 2	8.57 ± 1.18	0.72 ± 0.06	0.55 ± 0.04
2 (Alfa Building)	127-RS-0808	2 – 3	16.29 ± 1.67	0.61 ± 0.06	0.61 ± 0.04
2 (Alfa Building)	127-RS-0814	3 – 3.75	12.42 ± 1.49	0.74 ± 0.06	0.55 ± 0.04
3 (Alfa Building)	127-RS-0809	0 – 1	11.70 ± 1.49	0.71 ± 0.07	0.66 ± 0.04
3 (Alfa Building)	127-RS-0810	1 – 2	24.57 ± 1.24	0.67 ± 0.06	0.63 ± 0.04
3 (Alfa Building)	127-RS-0811	2 – 3	13.11 ± 1.31	0.61 ± 0.06	0.60 ± 0.04
3 (Alfa Building)	127-RS-0812	3 – 4	17.33 ± 1.73	0.73 ± 0.07	0.61 ± 0.04
3 (Alfa Building)	127-RS-0813	4 – 5	14.35 ± 1.59	0.66 ± 0.07	0.61 ± 0.04
4 (Building A/C Area)	127-RS-0815	0 – 1	2.24 ± 1.04	1.16 ± 0.07	1.39 ± 0.06
4 (Building A/C Area)	127-RS-0816	1 – 2	<4.08	1.77 ± 0.10	2.09 ± 0.08
4 (Building A/C Area)	127-RS-0817	2 – 3	4.71 ± 1.22	0.97 ± 0.08	1.08 ± 0.05
4 (Building A/C Area)	127-RS-0818	3 – 4	2.94 ± 1.39	1.59 ± 0.09	1.35 ± 0.06
5 (Building A/C Area)	127-RS-0819	0 – 1	<2.95	0.50 ± 0.05	0.55 ± 0.04
5 (Building A/C Area)	127-RS-0820	1 – 2	2.98 ± 1.37	0.71 ± 0.06	0.74 ± 0.05
5 (Building A/C Area)	127-RS-0821	2 – 3	4.28 ± 1.09	0.68 ± 0.06	0.73 ± 0.05
5 (Building A/C Area)	127-RS-0822	3 – 4	5.10 ± 1.13	0.81 ± 0.07	0.78 ± 0.05
6 (Building A/C Area)	127-RS-0823	0 – 1	<3.17	0.56 ± 0.06	0.65 ± 0.04
6 (Building A/C Area)	127-RS-0824	1 – 2	1.14 ± 0.96	0.57 ± 0.06	0.62 ± 0.04
6 (Building A/C Area)	127-RS-0825	2 – 3	1.77 ± 0.94	0.78 ± 0.06	0.69 ± 0.04
6 (Building A/C Area)	127-RS-0826	3 – 4	4.19 ± 1.24	0.90 ± 0.07	0.64 ± 0.04
6 (Building A/C Area)	127-RS-0827	4 – 5	2.77 ± 1.19	0.74 ± 0.07	0.71 ± 0.04
7 (Building A/C Area)	127-RS-0828	0 – 1	3.72 ± 1.01	0.69 ± 0.06	0.51 ± 0.04
7 (Building A/C Area)	127-RS-0829	1 – 2	3.90 ± 1.25	0.67 ± 0.07	0.66 ± 0.04
7 (Building A/C Area)	127-RS-0830	2 – 3	<3.37	0.84 ± 0.07	0.56 ± 0.05
7 (Building A/C Area)	127-RS-0831	3 – 4	2.79 ± 1.14	0.86 ± 0.07	0.72 ± 0.05
Harbor					
8 (Grid 31)	127-RS-0832	2 – 3	<2.55	0.60 ± 0.06	0.43 ± 0.04
8 (Grid 31)	127-RS-0833	3 – 3.5	<2.39	0.44 ± 0.05	0.37 ± 0.04
9 (Grid 33)	127-RS-0834	2 – 2.5	<2.72	0.53 ± 0.06	0.59 ± 0.04
10 (Grid 16)	127-RS-0835	2 – 2.5	13.17 ± 1.26	0.52 ± 0.06	0.39 ± 0.04
10 (Grid 16)	127-RS-0836	2.5 – 3	5.68 ± 0.96	0.38 ± 0.06	0.36 ± 0.03

Alfa Building (Building J) Demolition Data

Table D-2 in the PRAR

Sample ID	Material	U-238 (pCi/g)	Th-232 (pCi/g)	Ra-226 (pCi/g)
127-RS-610	Metal	0.57 ± 0.74	<0.53	<0.37
127-RS-611	Roofing	<3.00	<1.10	<0.62
127-RS-612	Concrete	<2.10	0.64 ± 0.10	1.30 ± 0.08
127-RS-613	Wood	<9.70	<2.70	<1.60

Buildings A and A-1 Demolition Data

Table D-1 in the PRAR

Sample ID	Pile Location	U-238 (pCi/g)	Th-232 (pCi/g)	Ra-226 (pCi/g)
127-RS-097	Quadrant A	<2.00	<0.57	0.45 ± 0.06
127-RS-098	Quadrant A	<1.50	0.57 ± 0.08	0.43 ± 0.05
127-RS-099	Quadrant A	<1.30	0.53 ± 0.08	0.43 ± 0.04
127-RS-100	Quadrant A	<1.30	0.70 ± 0.10	0.36 ± 0.05
127-RS-101	Quadrant A	<2.10	0.63 ± 0.13	0.59 ± 0.06
127-RS-102	Quadrant A	1.20 ± 0.53	0.75 ± 0.10	0.44 ± 0.05
127-RS-103	Quadrant A	<2.00	0.59 ± 0.09	0.47 ± 0.06
127-RS-104	Quadrant A	<2.50	0.63 ± 0.14	0.61 ± 0.08
127-RS-105	Quadrant A	<2.30	0.49 ± 0.12	0.62 ± 0.06
127-RS-106	Quadrant B	<2.30	0.65 ± 0.14	0.62 ± 0.07
127-RS-107	Quadrant B	<3.20	<0.89	0.61 ± 0.10
127-RS-108	Quadrant B	3.60 ± 1.30	<0.98	0.95 ± 0.14
127-RS-109	Quadrant B	3.10 ± 1.60	<1.30	1.20 ± 0.15
127-RS-110	Quadrant B	<2.60	0.95 ± 0.14	0.90 ± 0.08
127-RS-111	Quadrant B	<3.70	1.10 ± 0.16	0.78 ± 0.11
127-RS-112	Quadrant B	1.30 ± 1.00	1.10 ± 0.16	1.00 ± 0.10
127-RS-113	Quadrant B	<3.40	0.88 ± 0.18	0.67 ± 0.09
127-RS-114	Quadrant B	<3.20	0.71 ± 0.14	0.82 ± 0.09
127-RS-115	Quadrant C	0.40 ± 0.46	<0.48	0.39 ± 0.05
127-RS-116	Quadrant C	<3.70	0.78 ± 0.18	0.55 ± 0.10
127-RS-117	Quadrant C	<3.20	<0.79	0.59 ± 0.08
127-RS-118	Quadrant C	<2.40	0.85 ± 0.15	0.62 ± 0.07
127-RS-119	Quadrant C	<2.70	0.82 ± 0.15	0.57 ± 0.08
127-RS-120	Quadrant C	<1.90	0.71 ± 0.12	0.55 ± 0.06
127-RS-121	Quadrant C	2.80 ± 1.30	0.89 ± 0.19	0.76 ± 0.13
127-RS-122	Quadrant C	1.70 ± 0.89	<0.75	0.73 ± 0.09
127-RS-123	Quadrant C	<3.60	0.94 ± 0.20	0.74 ± 0.10
127-RS-124	Quadrant D	<3.50	0.91 ± 0.24	0.98 ± 0.13
127-RS-125	Quadrant D	<4.20	<1.10	<0.76
127-RS-126	Quadrant D	<2.20	<0.58	0.45 ± 0.07
127-RS-127	Quadrant D	<2.40	<0.61	0.63 ± 0.08
127-RS-128	Quadrant D	<3.00	<0.76	0.42 ± 0.09
127-RS-129	Quadrant D	<2.10	<0.53	0.38 ± 0.07
127-RS-130	Quadrant D	1.20 ± 0.87	<0.78	<0.51
127-RS-131	Quadrant D	<3.50	<0.95	<0.60
127-RS-132	Quadrant D	<3.20	0.50 ± 0.16	0.54 ± 0.10
127-RS-133	Quadrant D	<0.90	<0.23	<0.16
127-RS-134	Quadrant D	<0.84	<0.24	<0.16
127-RS-135	Pile Grab	<2.20	0.69 ± 0.12	1.20 ± 0.08
127-RS-142	Quadrant E	<1.90	0.55 ± 0.10	0.58 ± 0.06
127-RS-143	Quadrant E	<2.40	0.43 ± 0.11	<0.37
127-RS-144	Quadrant E	<2.70	0.90 ± 0.13	0.61 ± 0.07
127-RS-145	Quadrant E	1.60 ± 0.67	0.76 ± 0.10	0.60 ± 0.06
127-RS-146	Quadrant E	0.23 ± 0.69	<0.76	0.52 ± 0.08
127-RS-147	Quadrant E	2.40 ± 0.77	<0.46	0.30 ± 0.06
127-RS-148	Quadrant E	<2.80	0.54 ± 0.12	0.46 ± 0.07
127-RS-149	Quadrant E	3.20 ± 0.97	0.61 ± 0.10	0.61 ± 0.06
127-RS-150	Quadrant E	1.70 ± 0.80	<0.52	0.42 ± 0.06

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Beverly, Massachusetts, Site Certification Data Summary Worksheet

Post-Remedial Action Data, Excavations 1, 2, and 3					
Table D-3 in the PRAR					
Grid Location	**Sample ID**	**Sample Type**	**U-238 (pCi/g)**	**Th-232 (pCi/g)**	**Ra-226 (pCi/g)**
Excavation 1 (NW Corner of Site)					
S0 - E0	127-RS-088	Composite	8.8 ± 2.3	0.92 ± 0.12	1.0 ± 0.08
S3 - E9	127-RS-136	Highest Area	6.6 ± 1.8	0.43 ± 0.10	0.44 ± 0.06
S0 - E10	127-RS-091	Composite	6.8 ± 1.80	0.79 ± 0.10	0.64 ± 0.06
S2 - E14	127-RS-137	Highest Area	12.7 ± 3.30	1.7 ± 0.16	1.3 ± 0.11
Excavation 2 (Near Buildings A and A- 1 Slabs)					
S0 - E50	127-RS-092	Composite	9.9 ± 2.70	0.89 ± 0.16	0.88 ± 0.11
S0 - E50	127-RS-093	Highest Area	14.1 ± 3.60	0.7 ± 0.12	0.65 ± 0.07
S10 - E50	127-RS-094	Composite	15.8 ± 4.10	1.2 ± 0.21	0.6 ± 0.10
S10 - E50	127-RS-095	Highest Area	34.1 ± 2.50	1.3 ± 0.15	1 ± 0.09
Excavation 3 (Near Building E)					
S30 - E130	127-RS-096	Composite	2.9 ± 1.10	<0.81	0.6 ± 0.09

Building A Soil Beneath Slab Samples					
Table D-10 in the PRAR					
Sample Number	**Sample ID**	**Sample Type**	**U-238 (pCi/g)**	**Th-232 (pCi/g)**	**Ra-226 (pCi/g)**
1	127-RS-257	Discrete	<4.40	1.70 ± 0.25	2.20 ± 0.14
2	127-RS-258	Discrete	<3.60	2.50 ± 0.20	2.60 ± 0.14
3	127-RS-259	Discrete	<2.90	1.70 ± 0.15	1.70 ± 0.10
4	127-RS-260	Discrete	10.20 ± 2.80	<1.40	2.50 ± 0.16
5	127-RS-261	Discrete	<3.50	2.20 ± 0.21	2.20 ± 0.13
6	127-RS-262	Discrete	<4.30	<1.20	2.10 ± 0.14
7	127-RS-263	Discrete	2.9	2.20 ± 0.22	2.00 ± 0.12
8	127-RS-264	Discrete	<4.10	<1.20	2.20 ± 0.14
9	127-RS-265	Discrete	2.6	1.40 ± 0.15	1.70 ± 0.09
10	127-RS-266	Discrete	<2.50	0.81 ± 0.15	0.93 ± 0.08
11	127-RS-267	Discrete	4.2	1.80 ± 0.16	1.80 ± 0.10
12	127-RS-268	Discrete	<3.40	1.80 ± 0.20	2.70 ± 0.14
13	127-RS-269	Discrete	<4.70	2.10 ± 0.25	2.40 ± 0.17
14	127-RS-270	Discrete	<3.7	1.3 ± 0.22	1.8 ± 0.12
15	127-RS-271	Discrete	<3.3	0.9 ± 0.17	1.3 ± 0.11
16	127-RS-272	Discrete	<2.60	1.50 ± 0.16	1.40 ± 0.09
17	127-RS-273	Discrete	<2.40	<0.73	0.47 ± 0.08
18	127-RS-274	Discrete	<2.50	<0.79	1.60 ± 0.10
19	127-RS-422	Discrete	<5.49	1.93 ± 0.16	2.33 ± 0.11
20	127-RS-423	Discrete	<5.74	1.68 ± 0.17	2.09 ± 0.12
21	127-RS-426	Discrete	<2.59	0.60 ± 0.07	0.48 ± 0.04

Post-Remedial Action Data, Excavation 4					
Alfa Building (Building J)					
Table D-4 in the PRAR					
Grid Location	**Sample ID**	**Sample Type**	**U-238 (pCi/g)**	**Th-232 (pCi/g)**	**Ra-226 (pCi/g)**
S60 - E150	127-RS-232	Composite	36.3 ± 4.9	<0.66	0.66 ± 0.08
S60 - E150	127-RS-231	Highest Area	32.6 ± 2.00	1.2 ± 0.15	0.62 ± 0.08
S70 - E140	127-RS-228	Composite	<2.9	1.4 ± 0.13	0.49 ± 0.07
S70 - E140	127-RS-227	Highest Area	5.4 ± 1.6	<0.56	0.67 ± 0.07
S50 - E150	127-RS-230	Composite	11.4± 3.3	1.3 ± 0.19	0.76 ± 0.11
S50 - E150	127-RS-229	Highest Area	20.6 ± 1.6	1.5 ± 0.17	1 ± 0.09
S70 - E130	127-RS-222	Composite	<3.2	1.6 ± 0.15	0.63 ± 0.08
S70 - E130	127-RS-221	Highest Area	<3.1	3 ± 0.2	<0.45
S60 - E140	127-RS-226	Composite	8.3 ± 2.3	1.5 ± 0.15	0.67 ± 0.09
S60 - E140	127-RS-225	Highest Area	<2.90	2.6 ± 0.15	0.41 ± 0.07
S60 - E130	127-RS-220	Composite	<3.90	2.1 ± 0.19	1.1 ± 0.11
S60 - E130	127-RS-289	Highest Area	<4.95	7.74 ± 0.36	1.15 ± 0.15
S50 - E140	127-RS-224	Composite	7.2 ± 2.0	1.3 ± 0.13	0.63 ± 0.08
S50 - E140	127-RS-223	Highest Area	<1.9	0.8 ± 0.12	<0.3
S50 - E130	127-RS-287	Composite	7.7 ± 0.83	1.4 ± 0.12	0.74 ± 0.06
S50 - E130	127-RS-288	Highest Area	23.1 ± 5.8	2.6 ± 0.19	0.77 ± 0.11
S50/60 - E130/140	127-RS-290	Composite	4.84 ± 1.36	1.75 ± 0.13	0.83 ± 0.07
Phase II - Railroad Excavation (uses special grid)					
0E - 0S	127-RS-527	Discrete	10.83 ± 2.65	1.11 ± 0.09	0.81 ± 0.06
0E - 2S	127-RS-528	Discrete	16.82 ± 2.77	1.26 ± 0.11	1 ± 0.06
0E - 4S	127-RS-529	Discrete	22.9 ± 2.75	0.83 ± 0.09	0.97 ± 0.06
0E - 6S	127-RS-530	Discrete	25.0 ± 3.16	1.17 ± 0.10	0.89 ± 0.06
0E - 8S	127-RS-531	Discrete	8.63 ± 2.21	0.64 ± 0.09	0.84 ± 0.06
0E - 10S	127-RS-532	Discrete	39.49 ± 3.72	1.10 ± 0.11	0.95 ± 0.07
0E - 12S	127-RS-533	Discrete	1.87 ± 2.26	0.76 ± 0.10	0.91 ± 0.07
2E - 0S	127-RS-534	Discrete	25.57 ± 3.43	1.44 ± 0.12	1.46 ± 0.08
2E - 2S	127-RS-535	Discrete	21.75 ± 3.06	2.00 ± 0.12	1.04 ± 0.06
2E - 4S	127-RS-536	Discrete	15.11 ± 2.86	1.13 ± 0.11	0.82 ± 0.07
2E - 6S	127-RS-537	Discrete	21.3 ± 3.04	1.12 ± 0.11	0.89 ± 0.07
2E - 8S	127-RS-538	Discrete	7.52 ± 2.42	0.83 ± 0.09	0.79 ± 0.06
2E - 10S	127-RS-539	Discrete	12.05 ± 1.96	0.77 ± 0.09	0.77 ± 0.06
2E - 12S	127-RS-540	Discrete	9.96 ± 2.05	0.88 ± 0.09	0.77 ± 0.06
4E - 0S	127-RS-541	Discrete	3.60 ± 1.64	0.48 ± 0.08	0.50 ± 0.05
4E - 2S	127-RS-542	Discrete	34.92 ± 3.66	1.17 ± 0.10	0.91 ± 0.07
4E - 4S	127-RS-543	Discrete	24.38 ± 3.47	1.38 ± 0.12	1.20 ± 0.08
4E - 6S	127-RS-544	Discrete	6.69 ± 2.60	0.89 ± 0.11	0.78 ± 0.06
4E - 8S	127-RS-545	Discrete	11.47 ± 2.39	0.88 ± 0.10	0.72 ± 0.06
4E - 10S	127-RS-546	Discrete	7.66 ± 1.93	0.82 ± 0.08	0.65 ± 0.05
4E - 12S	127-RS-547	Discrete	0.74 ± 1.90	0.55 ± 0.08	0.68 ± 0.05
4E - 14S	127-RS-548	Discrete	3.47 ± 1.93	0.79 ± 0.09	0.71 ± 0.05
6E - 0S	127-RS-549	Discrete	0.58 ± 2.06	0.81 ± 0.08	0.76 ± 0.05
6E - 2S	127-RS-550	Discrete	<3.03	0.66 ± 0.08	0.51 ± 0.04
6E - 4S	127-RS-551	Discrete	0.65 ± 1.94	0.70 ± 0.07	0.49 ± 0.04
6E - 6S	127-RS-552	Discrete	<3.03	0.64 ± 0.07	0.45 ± 0.04
6E - 8S	127-RS-553	Discrete	19.72 ± 2.83	0.80 ± 0.10	0.88 ± 0.06
6E - 10S	127-RS-554	Discrete	2.70 ± 1.83	0.73 ± 0.09	0.60 ± 0.05
6E - 12S	127-RS-555	Discrete	0.15 ± 2.35	1.13 ± 0.09	0.75 ± 0.05
6E - 14S	127-RS-556	Discrete	3.56 ± 1.72	0.98 ± 0.09	0.75 ± 0.06
Area Comp.	127-RS-557	Composite	16.96 ± 2.67	0.92 ± 0.10	0.89 ± 0.07
Highest Area	127-RS-558	Discrete	38.15 ± 3.60	1.24 ± 0.10	0.73 ± 0.06
Highest Area	127-RS-559	Discrete	43.81 ± 3.95	1.15 ± 0.10	0.96 ± 0.07
3E - 4S	127-RS-568	Highest Area	27.36 ± 3.06	1.27 ± 0.10	0.72 ± 0.06
3E - 4S	127-RS-569	Highest Area	46.63 ± 3.43	0.98 ± 0.09	0.86 ± 0.06
1E - 5S	127-RS-570	Highest Area	38.08 ± 3.48	1.4 ± 0.10	0.88 ± 0.06
1E - 5S	127-RS-571	Highest Area	24.87 ± 2.99	1.04 ± 0.09	0.88 ± 0.06
Phase III - Under Alfa Building					
150/140E - 40/40S	127-RS-633	Composite	26.67 ± 2.17	0.9 ± 0.06	0.81 ± 0.04
150E - 50S	127-RS-632	Composite	21.1 ± 1.86	0.91 ± 0.06	0.68 ± 0.03
160E - 50S	127-RS-630	Composite	13.51 ± 1.94	0.79 ± 0.07	0.7 ± 0.04
160E - 60S	127-RS-631	Composite	7.42 ± 1.40	0.78 ± 0.06	0.71 ± 0.04
Alfa Pit (150E - 50S) Bottom	127-RS-646	Composite	35.08 ± 3.18	0.84 ± 0.08	0.61 ± 0.05

–continued to page 6–

–continued from page 5–

Beverly, Massachusetts, Site Certification Data Summary Worksheet

Post-Remedial Action Data, Excavation 5 (Harbor)

Table D-5 in the PRAR

Grid Location	Sample ID	Sample Type	U-238 (pCi/g)	Th-232 (pCi/g)	Ra-226 (pCi/g)
Grid 1	12795006	Composite	0.37 ± 0.46	0.46 ± 0.10	0.60 ± 0.09
Grid 2	12795007	Composite	<1.90	<0.58	0.47 ± 0.07
Grid 3	12795008	Composite	<1.70	0.48 ± 0.11	0.44 ± 0.10
Grid 4	12795009	Composite	<1.80	0.36 ± 0.19	0.52 ± 0.12
Grid 5	12795010	Composite	<1.70	<0.53	0.36 ± 0.09
Grid 6	12795011	Composite	<1.90	0.27 ± 0.10	0.45 ± 0.07
Grid 7	12795012	Composite	<1.50	0.41 ± 0.11	0.39 ± 0.08
Grid 8	12795013	Composite	1.70 ± 0.67	0.26 ± 0.13	0.61 ± 0.11
Grid 9	12795014	Composite	2.70 ± 0.87	0.47 ± 0.07	0.52 ± 0.10
Grid 10	12795015	Composite	2.10 ± 0.81	0.33 ± 0.16	0.39 ± 0.08
Grid 11	12795016	Composite	8.10 ± 2.20	0.58 ± 0.09	0.29 ± 0.09
Grid 12	12795017	Composite	<2.70	0.54 ± 0.11	0.45 ± 0.11
Grid 13	12795018	Composite	1.30 ± 0.65	0.65 ± 0.13	0.51 ± 0.10
Grid 14	12795036	Composite	<3.10	<0.86	0.40 ± 0.15
Grid 15	12795019	Composite	5.60 ± 1.60	0.59 ± 0.11	0.50 ± 0.10
Grid 16	12795020	Composite	13.30 ± 1.70	0.38 ± 0.11	0.43 ± 0.12
Grid 17	12795031	Composite	9.50 ± 2.60	0.34 ± 0.11	0.56 ± 0.08
Grid 18	12795021	Composite	21.50 ± 4.40	0.60 ± 0.08	0.57 ± 0.11
Grid 19	12795022	Composite	3.00 ± 0.98	0.71 ± 0.16	0.43 ± 0.11
Grid 21	12795024	Composite	6.10 ± 1.70	0.77 ± 0.12	0.70 ± 0.13
Grid 22	12795025	Composite	<2.20	0.61 ± 0.11	0.37 ± 0.07
Grid 23	12795026	Composite	3.60 ± 1.10	0.39 ± 0.08	0.53 ± 0.10
Grid 24	12795027	Composite	<2.00	0.55 ± 0.13	0.39 ± 0.07
Grid 25	12795028	Composite	<2.10	0.78 ± 0.13	0.38 ± 0.08
Grid 26	12795029	Composite	<1.90	0.38 ± 0.08	0.56 ± 0.09
Grid 27	12795030	Composite	1.80 ± 0.73	0.35 ± 0.08	0.45 ± 0.10
Grid 31	12795032	Composite	9.80 ± 2.90	3.60 ± 0.67	0.47 ± 0.18
Grid 33	12795033	Composite	4.20 ± 1.30	<0.59	0.52 ± 0.10
Grid 34	12795041	Composite	<2.40	0.59 ± 0.15	0.44 ± 0.13
Grid 35	12795042	Composite	0.74 ± 0.70	0.67 ± 0.11	0.43 ± 0.13
Grid 36	12795043	Composite	1.10 ± 0.65	<0.62	0.48 ± 0.12
Grid 37	12795044	Composite	1.80 ± 0.79	<0.64	0.46 ± 0.13
Grid 38	12795037	Composite	<4.10	0.36 ± 0.13	0.51 ± 0.13
Grid 39	12795038	Composite	<3.10	0.56 ± 0.20	0.51 ± 0.18
Grid 40	12795039	Composite	<4.00	0.84 ± 0.19	0.61 ± 0.13
Grid 41	12795040	Composite	<4.40	0.60 ± 0.37	1.00 ± 0.28
Grid 42	12795034	Composite	<4.40	<1.50	0.52 ± 0.21
Grid 43	12795035	Composite	1.30 ± 1.10	0.91 ± 0.19	0.83 ± 0.17
Phase II					
Grid 20	127-RS-151	Discrete	13.0 ± 1.1	1 ± 0.12	0.47 ± 0.07
Grid 20	127-RS-152	Discrete	8.6 ± 0.83	1 ± 0.09	0.57 ± 0.05
Grid 20	127-RS-153	Discrete	2.1 ± 0.70	0.57 ± 0.09	0.47 ± 0.05
Grid 20	127-RS-154	Discrete	2.4 ± 0.83	0.46 ± 0.10	0.33 ± 0.06
Grid 20	127-RS-155	Discrete	4.3 ± 1.30	0.7 ± 0.11	0.88 ± 0.07
Grid 20	127-RS-156	Discrete	6.6 ± 1.80	0.61 ± 0.11	0.69 ± 0.06
Grid 20	127-RS-157	Discrete	12.9 ± 1.2	0.77 ± 0.13	0.51 ± 0.08
Grid 20	127-RS-158	Discrete	6.7 ± 0.83	0.98 ± 0.13	0.47 ± 0.06
Grid 20	127-RS-159	Discrete	<3.3	0.64 ± 0.15	0.55 ± 0.10
Grid 20	127-RS-160	Discrete	17.3 ± 4.3	0.75 ± 0.11	0.48 ± 0.08
Grid 21	127-RS-639	Composite	37.6 ± 2.95	0.91 ± 0.08	0.59 ± 0.04
Grid 21	127-RS-647	Discrete	11.0 ± 2.46	0.79 ± 0.11	0.62 ± 0.06
Grid 21	127-RS-650	Discrete	18.1 ± 2.60	1.50 ± 0.11	0.64 ± 0.05
Grid 21	127-RS-651	Discrete	12.3 ± 3.01	0.85 ± 0.12	0.74 ± 0.07
Grid 28	127-RS-172	Discrete	<2.4	<0.6	0.84 ± 0.08
Grid 28	127-RS-175	Discrete	1.1 ± 0.53	0.39 ± 0.08	0.37 ± 0.05
Grid 28	127-RS-181	Discrete	3.3 ± 0.93	0.49 ± 0.08	0.27 ± 0.04
Grid 28	127-RS-182	Discrete	5.6 ± 1.5	0.64 ± 0.10	0.43 ± 0.06
Grid 28	127-RS-183	Discrete	2.9 ± 0.92	<0.51	0.55 ± 0.06
Grid 29	127-RS-171	Discrete	7.4 ± 2.0	0.83 ± 0.12	0.36 ± 0.07
Grid 29	127-RS-173	Discrete	1.2 ± 0.57	0.5 ± 0.08	0.58 ± 0.05
Grid 29	127-RS-174	Discrete	8.8 ± 1.0	0.75 ± 0.11	0.53 ± 0.07
Grid 29	127-RS-176	Discrete	3.4 ± 0.10	0.59 ± 0.09	<0.3
Grid 29	127-RS-177	Discrete	7.8 ± 2.00	0.65 ± 0.09	0.56 ± 0.06
Grid 29	127-RS-178	Discrete	6.7 ± 1.8	1.1 ± 0.14	0.7 ± 0.07
Grid 29	127-RS-179	Discrete	8.5 ± 2.2	<0.39	0.26 ± 0.04
Grid 29	127-RS-180	Discrete	16.5 ± 1.2	0.37 ± 0.10	<0.29
Grid 30	127-RS-166	Discrete	1.3 ± 0.61	0.59 ± 0.10	0.88 ± 0.06
Grid 30	127-RS-167	Discrete	<2.3	0.63 ± 0.11	1.3 ± 0.07
Grid 30	127-RS-168	Discrete	11.4 ± 2.9	0.93 ± 0.12	0.69 ± 0.07
Grid 30	127-RS-169	Discrete	9.3 ± 0.94	0.44 ± 0.10	0.97 ± 0.07
Grid 30	127-RS-170	Discrete	1.6 ± 0.65	0.61 ± 0.11	0.77 ± 0.06
Grid 31	127-RS-161	Discrete	<2.8	<0.64	1.1 ± 0.08
Grid 31	127-RS-162	Discrete	2.9 ± 0.89	0.58 ± 0.09	0.87 ± 0.06
Grid 31	127-RS-163	Discrete	3 ± 1.0	0.84 ± 0.10	0.7 ± 0.07
Grid 31	127-RS-164	Discrete	2.9 ± 0.90	0.76 ± 0.09	1.1 ± 0.07
Grid 31	127-RS-165	Discrete	<2.1	0.68 ± 0.11	0.92 ± 0.07
Grid 32	127-RS-197	Discrete	<1.81	<0.42	<0.33
Grid 32	127-RS-198	Discrete	<2.25	0.73 ± 0.13	1.1 ± 0.07
Grid 32	127-RS-199	Discrete	<2.17	0.57 ± 0.11	0.83 ± 0.07
Grid 32	127-RS-200	Discrete	5.76 ± 1.64	0.89 ± 0.14	0.9 ± 0.08
Grid 32	127-RS-201	Discrete	<1.93	0.67 ± 0.12	0.81 ± 0.06
Grid 44	127-RS-202	Discrete	<2.43	0.51 ± 0.12	0.86 ± 0.08
Grid 44	127-RS-203	Discrete	<1.86	0.74 ± 0.11	1.14 ± 0.07
Grid 44	127-RS-204	Discrete	2.72 ± 0.96	0.51 ± 0.16	0.53 ± 0.08
Grid 44	127-RS-205	Discrete	<1.54	<0.43	0.85 ± 0.06
Grid 44	127-RS-206	Discrete	<3.19	<0.55	<0.35
Grid 45	127-RS-212	Discrete	<2.3	0.62 ± 0.10	0.58 ± 0.07
Grid 45	127-RS-213	Discrete	2.9 ± 1.1	0.96 ± 0.19	0.75 ± 0.11
Grid 45	127-RS-214	Discrete	2.3 ± 0.84	0.7 ± 0.11	0.48 ± 0.06
Grid 45	127-RS-215	Discrete	2.9 ± 0.99	<0.68	0.5 ± 0.07
Grid 45	127-RS-216	Discrete	1.5 ± 0.66	0.62 ± 0.09	0.43 ± 0.05
Grid 46	127-RS-207	Discrete	<2.33	0.77 ± 0.13	0.5 ± 0.07
Grid 46	127-RS-208	Discrete	<2.5	<0.63	0.38 ± 0.07
Grid 46	127-RS-209	Discrete	<2.9	2 ± 0.15	0.44 ± 0.08
Grid 46	127-RS-210	Discrete	<2.0	0.35 ± 0.10	0.55 ± 0.06
Grid 46	127-RS-211	Discrete	1.8 ± 0.81	0.67 ± 0.15	0.41 ± 0.08
Grid 29/30 HS Removal	127-RS-253	Discrete	3.4 ± 0.10	0.64 ± 0.10	0.51 ± 0.05
Grid 29/30 HS Removal	127-RS-254	Discrete	2.7 ± 0.98	0.52 ± 0.08	0.38 ± 0.05
Grid 29/30 HS Removal	127-RS-255	Discrete	<1.9	0.55 ± 0.08	0.3 ± 0.05
Grid 29/30 HS Removal	127-RS-256	Discrete	<1.9	0.5 ± 0.09	0.4 ± 0.05

Post-Remedial Action Data, Excavation 6

Samples Near Vicinity of Seawall

Table D-6 in the PRAR

Seawall Proximity Location	Sample ID	Sample Type	U-238 (pCi/g)	Th-232 (pCi/g)	Ra-226 (pCi/g)
Location 1	127-RS-285	Composite	12.3 ± 3.10	0.79 ± 0.08	0.40 ± 0.05
	127-RS-286	Highest Area	15.1 ± 3.80	1.1 ± 0.14	0.47 ± 0.08
Location 2	127-RS-296	Composite	25.89 ± 1.93	1.16 ± 0.15	0.86 ± 0.08
	127-RS-297	Composite	18.1 ± 4.51	0.77 ± 0.13	0.69 ± 0.07
	127-RS-298	Highest Area	5.3 ± 1.39	0.42 ± 0.07	0.42 ± 0.06
Location 3	127-RS-295	Composite	21.16 ± 1.52	0.69 ± 0.69	0.34 ± 0.07
	127-RS-294	Composite	29.31 ± 2.07	0.59 ± 0.10	0.52 ± 0.06
	127-RS-293	Highest Area	16.73 ± 4.28	<0.94	0.52 ± 0.11
Location 4	127-RS-299	Composite	22.7 ± 1.90	1.6 ± 0.17	1.6 ± 0.11
	127-RS-300	Composite	24.9 ± 6.20	<0.96	1.3 ± 0.11
	127-RS-301	Highest Area	26.1 ± 6.40	0.86 ± 0.17	1.3 ± 0.10
Location 5	127-RS-302	Composite	8.4 ± 2.20	0.61 ± 0.11	0.6 ± 0.06
	127-RS-303	Composite	15.6 ± 4.00	0.84 ± 0.14	0.77 ± 0.10
	127-RS-304	Highest Area	11.3 ± 1.00	0.71 ± 0.11	0.61 ± 0.07
Location 6	127-RS-305	Composite	8.3 ± 2.40	1.2 ± 0.19	0.97 ± 0.12
	127-RS-306	Composite	27.6 ± 6.90	<1.1	1.9 ± 0.15
	127-RS-307	Highest Area	19.0 ± 1.7	1.7 ± 0.18	1.3 ± 0.11
Location 7	127-RS-308	Composite	14.8 ± 1.2	0.72 ± 0.11	0.57 ± 0.06
	127-RS-309	Composite	38.1 ± 2.50	<0.94	0.77 ± 0.10
	127-RS-310	Highest Area	7.2 ± 1.90	<0.61	<0.35
Location 8	127-RS-311	Composite	16 ± 1.40	1 ± 0.14	1.2 ± 0.09
	127-RS-312	Composite	18.7 ± 4.80	<1.2	<0.77
	127-RS-313	Highest Area	8.8 ± 0.89	0.57 ± 0.12	0.86 ± 0.07
Location 9	127-RS-314	Composite	20.7 ± 1.50	0.59 ± 0.08	0.50 ± 0.05
	127-RS-315	Composite	23.6 ± 1.60	0.55 ± 0.12	0.45 ± 0.07
	127-RS-316	Highest Area	29.6 ± 1.70	0.61 ± 0.12	<0.35
Location 10	127-RS-317	Composite	15 ± 1.20	0.61 ± 0.09	0.55 ± 0.05
	127-RS-318	Composite	11.5 ± 3.00	<0.62	0.58 ± 0.07
	127-RS-319	Highest Area	8.1 ± 2.10	0.92 ± 0.09	0.61 ± 0.06
Location 11	127-RS-320	Composite	12.8 ± 3.20	0.72 ± 0.12	0.45 ± 0.07
	127-RS-321	Composite	12.5 ± 3.10	1.1 ± 0.10	0.52 ± 0.05
	127-RS-322	Highest Area	3.7± 1.10	0.43 ± 0.09	0.34 ± 0.05
Location 12	127-RS-323	Composite	16.5 ± 1.30	0.78 ± 0.09	0.56 ± 0.06
	127-RS-324	Composite	25.9 ± 6.4	<0.64	0.5 ± 0.08
	127-RS-325	Highest Area	2.2 ± 0.83	<0.75	0.81 ± 0.08
Location 13	127-RS-326	Composite	11.6 ± 1.20	<0.58	0.42 ± 0.07
	127-RS-327	Composite	24.2 ± 1.80	0.65 ± 0.10	0.42 ± 0.05
	127-RS-328	Highest Area	5.7 ± 1.50	0.54 ± 0.09	0.37 ± 0.06
Location 14	127-RS-414	Composite	36.88 ± 3.42	0.75 ± 0.08	0.53 ± 0.05
	127-RS-415	Highest Area	21.79 ± 2.47	1.17 ± 0.10	0.75 ± 0.07
Location 15	127-RS-336	Composite	28.9 ± 3.02	0.97 ± 0.09	0.64 ± 0.06
	127-RS-337	Highest Area	<2.76	0.51 ± 0.07	0.45 ± 0.04
Location 16	127-RS-334	Composite	22.5 ± 2.49	0.9 ± 0.10	0.89 ± 0.06
	127-RS-335	Highest Area	12.98 ± 2.32	2.59 ± 0.18	2.24 ± 0.12
Location 17	127-RS-460	Composite	4.75 ± 1.68	0.52 ± 0.06	0.59 ± 0.04
Location 18	127-RS-464	Composite	18.8 ± 2.46	0.76 ± 0.07	0.57 ± 0.04
Location 19	127-RS-477	Composite	3.78 ± 1.63	0.73 ± 0.08	0.54 ± 0.05
Location 20	127-RS-518	Composite	6.98 ± 1.59	0.88 ± 0.12	0.64 ± 0.07
	127-RS-522	Highest Area	15.13 ± 1.86	0.93 ± 0.14	0.7 ± 0.08

Post-Remedial Action Data, Excavation 7

(Between Building A Slab and Building E)

Table D-8 in the PRAR

Grid Location	Sample ID	Sample Type	U-238 (pCi/g)	Th-232 (pCi/g)	Ra-226 (pCi/g)
S30-E100	127-RS-349	Composite	<4.63	0.67 ± 0.10	0.56 ± 0.06
S30-E100	127-RS-350	Highest Area	<3.82	0.69 ± 0.11	0.7 ± 0.07
S30-E110	127-RS-352	Composite	<4.52	0.94 ± 0.94	0.68 ± 0.06
S30-E110	127-RS-353	Highest Area	10.89 ± 1.77	0.84 ± 0.11	0.6 ± 0.08

Post-Remedial Action Data, Excavations 8, 9, 10, and 11

Table D-9 in the PRAR

Grid Location	Sample ID	Sample Type	U-238 (pCi/g)	Th-232 (pCi/g)	Ra-226 (pCi/g)
Excavation 8 (Building A Leach Tank Pit)					
S30-E80	127-RS-438	Composite	8.38 ± 2.46	1.03 ± 0.09	0.71 ± 0.06
Excavation 9 (Building A Fan Pit)					
S27-E66	127-RS-454	Composite	6.72 ± 1.92	0.51 ± 0.07	0.42 ± 0.04
S27-E66	127-RS-455	Highest Area	13.75 ± 2.62	1.42 ± 0.12	1.16 ± 0.08
Excavation 10					
S20-E50	127-RS-442	Composite	4.18 ± 1.92	1.08 ± 0.10	1.03 ± 0.07
S20-E50	127-RS-441A	Highest Area	1.52 ± 3.36	2.2 ± 0.17	2.62 ± 0.12
Excavation 11					
S20-E40	127-RS-438A	Composite	3.89 ± 3.00	2.46 ± 0.17	2.69 ± 0.12
S20-E40	127-RS-439A	Highest Area	22.51 ± 3.37	0.90 ± 0.10	1.01 ± 0.07

–continued to page 7–

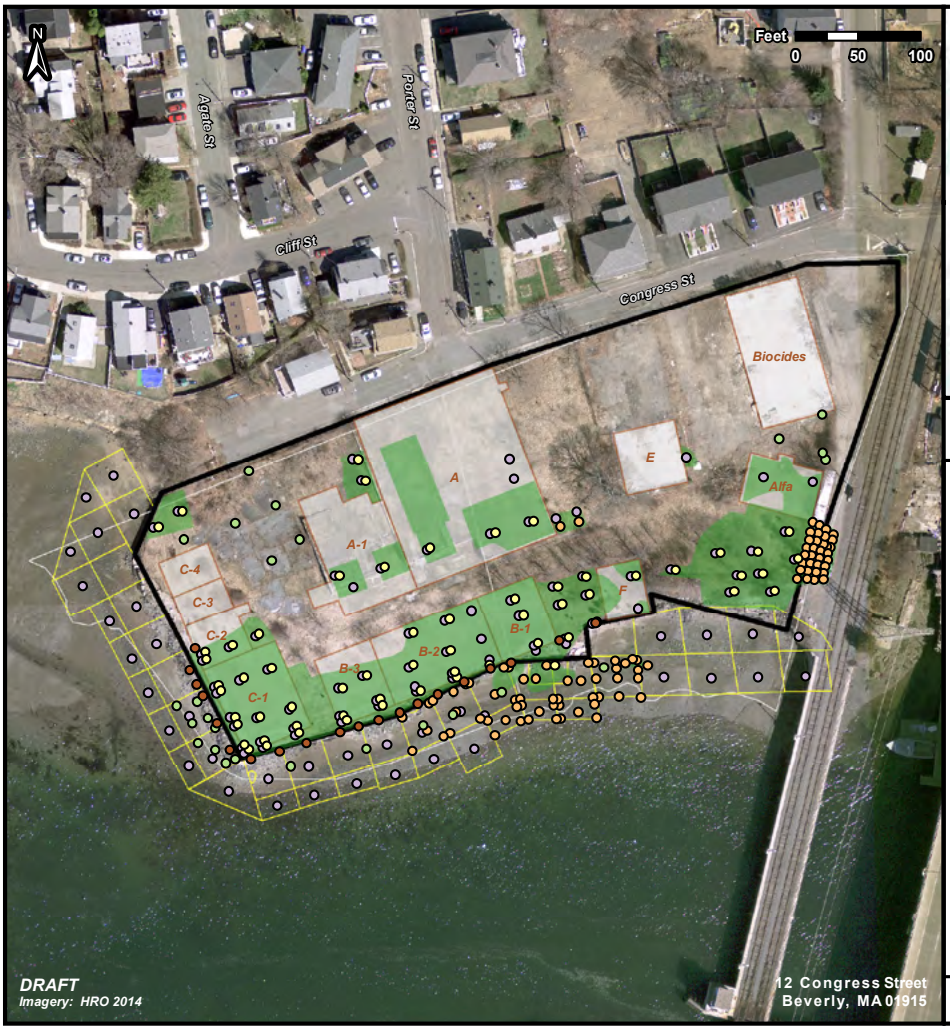
–continued from page 6–

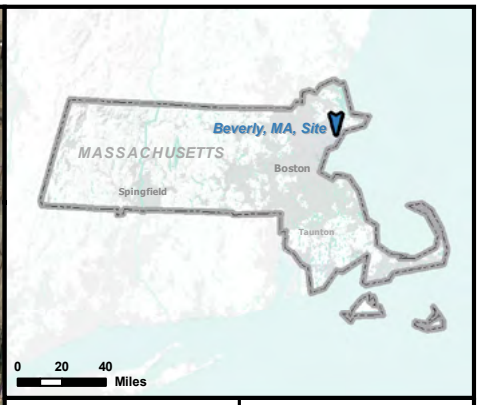
Beverly, Massachusetts, Site Certification Data Summary Worksheet

Post-Remedial Action Data, Excavation 6					
(From Building C Slab , Across Building B Slab, to Building F Slab)					
Table D-7 in the PRAR					
Grid Location	**Sample ID**	**Sample Type**	**U-238 (pCi/g)**	**Th-232 (pCi/g)**	**Ra-226 (pCi/g)**
S30-E0	127-RS-334	Composite	22.5 ± 2.49	0.9 ± 0.10	0.89 ± 0.06
S30-E0	127-RS-335	Highest Area	12.98 ± 2.32	2.55 ± 0.18	2.24 ± 0.12
S30-E10	127-RS-338	Composite	7.36 ±1.32	1.11 ± 0.11	0.94 ± 0.06
S30-E10	127-RS-339	Highest Area	19.8 ± 2.44	1.39 ± 0.12	1.13 ± 0.08
S30-E20	127-RS-340	Composite	5.31 ± 1.13	0.87 ± 0.09	0.86 ± 0.06
S30-E20	127-RS-341	Highest Area	<6.23	1.67 ± 0.14	1.96 ± 0.10
S40-E0	127-RS-342	Composite	44.3 ± 3.87	1.18 ± 0.10	0.9 ± 0.06
S40-E0	127-RS-343	Highest Area	37.5 ± 3.57	1.06 ± 0.10	1.13 ± 0.07
S40-E10	127-RS-344	Composite	22.4 ± 2.37	0.81 ± 0.08	0.78 ± 0.05
S40-E10	127-RS-345	Highest Area	29.5 ± 3.18	0.85 ± 0.09	0.6 ± 0.06
S40-E20	127-RS-347	Composite	9.84 ± 1.39	0.69 ± 0.08	0.58 ± 0.05
S40-E20	127-RS-348	Highest Area	7.63 ± 1.25	0.58 ± 0.08	0.58 ± 0.05
S50-E0	127-RS-465	Composite	8.87 ± 2.17	0.83 ± 0.08	0.82 ± 0.06
S50-E0	127-RS-356	Highest Area	45.03 ± 4.51	1.22 ± 0.11	0.78 ± 0.07
S50-E10	127-RS-357	Composite	41.89 ± 3.61	1.13 ± 0.09	0.79 ± 0.06
S50-E10	127-RS-358	Highest Area	35.26 ± 3.18	0.55 ± 0.08	0.38 ± 0.05
S50-E20	127-RS-373	Composite	20.7 ± 2.29	0.63 ± 0.08	0.51 ± 0.05
S50-E20	127-RS-374	Highest Area	17.94 ± 2.12	0.78 ± 0.10	0.56 ± 0.05
S60-E0	127-RS-359	Composite	45.79 ± 3.66	0.85 ± 0.08	0.72 ± 0.05
S60-E0	127-RS-360	Highest Area	30.34 ± 2.93	0.76 ± 0.08	0.58 ± 0.05
S60-E10	127-RS-361	Composite	21.08 ± 2.23	0.59 ± 0.07	0.54 ± 0.05
S60-E10	127-RS-362	Highest Area	7.51 ± 1.29	0.65 ± 0.09	0.45 ± 0.05
S60-E20	127-RS-370	Composite	23.05 ± 2.35	0.45 ± 0.06	0.45 ± 0.04
S60-E20	127-RS-371	Highest Area	<4.03	0.67 ± 0.08	0.43 ± 0.05
S50-E30	127-RS-380	Composite	44.7 ± 4.02	0.89 ± 0.09	0.85 ± 0.06
S50-E30	127-RS-439	Highest Area	48.50 ± 4.79	0.93 ± 0.10	0.80 ± 0.06
S60-E30	127-RS-364	Composite	32.87 ± 3.17	0.79 ± 0.10	0.61 ± 0.05
S60-E30	127-RS-365	Highest Area	13.82 ± 1.83	0.73 ± 0.09	0.62 ± 0.05
S50-E40	127-RS-382	Composite	26.92 ± 2.81	0.65 ± 0.08	0.76 ± 0.06
S50-E40	127-RS-383	Highest Area	23.34 ± 2.60	0.77 ± 0.10	0.77 ± 0.06
S60-E40	127-RS-366	Composite	40.38 ± 3.96	0.9 ± 0.10	1.08 ± 0.07
S60-E40	127-RS-379	Highest Area	<13.6	<2.12	<1.14
S50-E50	127-RS-399	Composite	31.67 ± 2.97	0.68 ± 0.08	0.64 ± 0.05
S50-E50	127-RS-431	Highest Area	18.15 ± 2.45	0.56 ± 0.07	0.48 ± 0.04
S60-E50	127-RS-430	Composite	34.8 ± 4.23	0.91 ± 0.10	0.61 ± 0.06
S40-E60	127-RS-412	Composite	42.05 ± 3.70	0.73 ± 0.08	0.6 ± 0.05
S40-E60	127-RS-413	Highest Area	40.16 ± 3.47	0.58 ± 0.08	0.59 ± 0.05
S50-E60	127-RS-441	Composite	38.3 ± 4.61	1.09 ± 0.10	1.04 ± 0.07
S50-E60	127-RS-440	Highest Area	40.59 ± 4.05	0.77 ± 0.09	0.74 ± 0.06
S60-E60	127-RS-458	Composite	12.8 ± 1.96	0.64 ± 0.07	0.78 ± 0.05
S60-E60	127-RS-415	Highest Area	21.79 ± 2.47	1.17 ± 0.10	0.75 ± 0.07
S40-E70	127-RS-463	Composite	8.0 ± 1.76	0.79 ± 0.07	0.69 ± 0.04
S50-E70	127-RS-462	Composite	17.21 ± 2.29	0.96 ± 0.08	0.68 ± 0.05
S60-E70	127-RS-461	Composite	16.43 ± 2.11	0.73 ± 0.07	0.49 ± 0.04
S40-E80	127-RS-510	Composite	12.46 ± 1.88	0.74 ± 0.10	0.69 ± 0.07
S40-E80	127-RS-511	Highest Area	11.31 ± 1.40	0.82 ± 0.13	0.69 ± 0.07
S50-E80	127-RS-512	Composite	35.43 ± 4.25	0.78 ± 0.10	0.68 ± 0.07
S50-E80	127-RS-513	Highest Area	31.47 ± 2.95	0.85 ± 0.14	0.64 ± 0.07
S60-E80	127-RS-514	Composite	34.97 ± 3.99	0.66 ± 0.10	0.62 ± 0.06
S60-E80	127-RS-515	Highest Area	32.15 ± 3.11	0.68 ± 0.12	0.65 ± 0.07
S40-E90	127-RS-580	Composite	14.1 ± 2.58	0.70 ± 0.08	0.62 ± 0.05
S40-E90	127-RS-581	Highest Area	16.22 ± 2.61	0.76 ± 0.08	0.60 ± 0.05
S50-E90	127-RS-582	Composite	11.76 ± 1.91	0.62 ± 0.07	0.53 ± 0.04
S50-E90	127-RS-583	Highest Area	10.27 ± 1.87	0.69 ± 0.07	0.50 ± 0.04
S60-E90	127-RS-584	Composite	5.59 ± 1.97	0.68 ± 0.07	0.60 ± 0.04
S60-E90	127-RS-585	Highest Area	8.55 ± 1.71	0.59 ± 0.07	0.49 ± 0.04
S70-E90	127-RS-586	Composite	4.43 ± 1.86	0.81 ± 0.09	0.63 ± 0.05
S40-E100	127-RS-587	Composite	14.64 ± 2.02	0.71 ± 0.07	0.59 ± 0.05
S40-E100	127-RS-588	Highest Area	13.58 ± 2.15	0.74 ± 0.08	0.58 ± 0.05
S50-E100	127-RS-589	Composite	22.8 ± 2.77	0.91 ± 0.09	0.62 ± 0.05
S50-E100	127-RS-590	Highest Area	20.6 ± 2.57	0.91 ± 0.09	0.59 ± 0.05
S60-E100	127-RS-591	Composite	18.44 ± 2.57	0.84 ± 0.09	0.64 ± 0.05
S60-E100	127-RS-592	Highest Area	18.23 ± 2.65	0.80 ± 0.08	0.49 ± 0.05
S60-E110	127-RS-595	Composite	4.17 ± 2.36	0.71 ± 0.09	0.59 ± 0.05
S60-E110	127-RS-596	Highest Area	6.78 ± 2.54	0.76 ± 0.10	0.54 ± 0.06
S50-E110	127-RS-593	Composite	8.92 ± 2.12	0.86 ± 0.09	0.61 ± 0.05
S50-E110	127-RS-594	Highest Area	8.08 ± 2.24	0.79 ± 0.09	0.60 ± 0.05

Gamma Exposure Rate Survey Data		
Table D-11 in the PRAR		
Excavation	**Grid Location**	**µR/h**
Excavation 1	S0-E0	11.5
Excavation 1	S0-E10	10.7
Excavation 2	S0-E50	10.7
Excavation 2	S10-E50	11.5
Excavation 3	S30-E130	9.0
Excavation 4	S50-E130	10.5
Excavation 4	S50-E140	10.6
Excavation 4	S50-E150	13.1
Excavation 4	S60-E140	10.6
Excavation 4	S60-E150	14.6
Excavation 4	S70-E130	10.8
Excavation 4	S70-E140	10.3
Excavation 4	S50-E140	13.0
Excavation 4	S50-E150	14.0
Excavation 4	S50-E160	12.0
Excavation 5	Harbor Grid 1	12.0
Excavation 5	Harbor Grid 2	12.0
Excavation 5	Harbor Grid 3	11.0
Excavation 5	Harbor Grid 4	11.0
Excavation 5	Harbor Grid 5	11.0
Excavation 5	Harbor Grid 6	12.0
Excavation 5	Harbor Grid 7	12.0
Excavation 5	Harbor Grid 8	10.0
Excavation 5	Harbor Grid 9	8.0
Excavation 5	Harbor Grid 10	9.0
Excavation 5	Harbor Grid 11	8.0
Excavation 5	Harbor Grid 12	8.0
Excavation 5	Harbor Grid 13	10.0
Excavation 5	Harbor Grid 14	10.0
Excavation 5	Harbor Grid 15	10.0
Excavation 5	Harbor Grid 16	9.0
Excavation 5	Harbor Grid 17	10.0
Excavation 5	Harbor Grid 18	9.0
Excavation 5	Harbor Grid 19	9.0
Excavation 5	Harbor Grid 20	8.0
Excavation 5	Harbor Grid 21	9.0
Excavation 5	Harbor Grid 22	9.0
Excavation 5	Harbor Grid 23	9.0
Excavation 5	Harbor Grid 24	9.0
Excavation 5	Harbor Grid 25	8.0
Excavation 5	Harbor Grid 26	10.0
Excavation 5	Harbor Grid 27	10.0
Excavation 5	Harbor Grid 28	10.0
Excavation 5	Harbor Grid 29	8.0
Excavation 5	Harbor Grid 30	10.0
Excavation 5	Harbor Grid 31	10.0
Excavation 5	Harbor Grid 32	10.0
Excavation 5	Harbor Grid 33	9.0
Excavation 5	Harbor Grid 34	9.0
Excavation 5	Harbor Grid 35	9.0
Excavation 5	Harbor Grid 36	8.0
Excavation 5	Harbor Grid 37	8.0
Excavation 5	Harbor Grid 38	8.0
Excavation 5	Harbor Grid 39	9.0
Excavation 5	Harbor Grid 40	8.0
Excavation 5	Harbor Grid 41	8.0
Excavation 5	Harbor Grid 42	10.0
Excavation 5	Harbor Grid 43	9.0
Excavation 5	Harbor Grid 44	10.0
Excavation 5	Harbor Grid 45	10.0
Excavation 5	Harbor Grid 46	8.0
Excavation 6	S30-E0	9.0
Excavation 6	S40-E0	9.0
Excavation 6	S50-E0	10.0
Excavation 6	S60-E0	10.0
Excavation 6	S30-E10	9.0
Excavation 6	S40-E10	10.0
Excavation 6	S50-E10	9.0
Excavation 6	S60-E10	9.0
Excavation 6	S30-E10	10.0
Excavation 6	S40-E20	11.0
Excavation 6	S50-E20	11.0
Excavation 6	S60-E20	10.0
Excavation 6	S50-E30	9.0
Excavation 6	S60-E30	9.0
Excavation 6	S50-E40	9.0
Excavation 6	S60-E40	9.0
Excavation 6	S50-E50	10.0
Excavation 6	S50-E70	10.0
Excavation 6	S50-E80	9.0
Excavation 6	S50-E90	10.0
Excavation 6	S50-E100	10.0
Excavation 6	S50-E110	10.0
Excavation 6	S60-E50	11.0
Excavation 6	S60-E60	10.0
Excavation 6	S60-E70	10.0
Excavation 6	S60-E80	10.0
Excavation 6	S60-E90	10.0
Excavation 6	S60-E100	10.0
Excavation 6	S60-E110	12.0
Excavation 7	S30-E100	11.0

Beverly, Massachusetts, Site Map





U.S. DEPARTMENT OF ENERGY
OFFICE OF LEGACY MANAGEMENT

Work Performed by
Navarro Research & Engineering, Inc.
Under DOE Contract Number DE-LM0000421

Beverly, MA, Site

- Boreholes
- Composite Post-RA Sample
- Discrete Post-RA Sample
- Sample of Elevated Grid Area (Biased to Evaluate Hot Spots)
- Seawall Sample Location
- Excavated Areas
- Buildings
- Verification Grid
- Parcels
- Original Site Boundary

DATE PREPARED: October 17, 2018

FILE NAME: BEV_DELIVERABLE

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back to top