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0076140

October 29, 1999

Mr. Dana C. Ward
U.S. Department of Energy
Richland Operations Office
Richland, WA 99352

Dear Mr. Ward:

SOIL SAMPLING IN THE FORMER 1100 AREA

Enclosed is a letter report discussing the collection and analysis of surface soil samples obtained from the former 1100 Area in July 1999. The samples were collected jointly by staff from the Pacific Northwest National Laboratory (PNNL) and the Washington State Department of Health (WDOH), at the direction of the Richland Operations Office. The samples collected by each agency were analyzed for radiological contaminants at separate laboratories and the results were combined and summarized for this report. If you have any questions, comments, or concerns about the enclosed information, please contact Dick Jaquish at (509) 628-2804 regarding WDOH data or R. W. (Bill) Hanf at (509) 376-8264 about PNNL data.

Sincerely,

R. W. (Bill) Hanf
Surface Environmental Surveillance Project

R. E. Jaquish
Washington State Department of Health

Enclosures

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Radiological Surveillance of Surface Soil Samples Collected in the Former 1100 Area in July 1999

Introduction

On October 1, 1998, the Hanford Site's 1100 Area was transferred from the U.S. Department of Energy to the Port of Benton as part of an economic diversification effort related to the Hanford Site's environmental management mission. The 1100 Area was a 768-acre parcel of land located on the south side of the site, along Stevens Drive, between the 300 Area and the city of Richland. It was generally used for non-research and non-nuclear activities, however, nuclear materials were occasionally stored there, potentially radiologically contaminated equipment was serviced there, and some cleanup of contaminated railroad equipment occurred there. Facilities within the site were used to support site services such as general stores, excess equipment storage, shipping and receiving, and transportation maintenance. Prior to transferring the property to the Port, Richland Operations Office (RL) inspected the facilities within the 1100 Area for potential radiological contamination. After transferring the property, RL decided that surface soil around 1100 Area facilities should also be monitored for radiological contaminants. Potential sources of contaminants at these locations, other then those mentioned above, included airborne materials from DOE facilities on the site, airborne materials from private nuclear facilities on and around the site, and materials that could have been carried into the area by railroad activities or other means. This letter describes the post-transfer surface soil sampling conducted in 1999 by the Pacific Northwest National Laboratory (PNNL) and the Washington State Department of Health (WDOH), and summarizes the results of the analytical tests performed on those samples.

Sample Collection

On July 13 and 14, 1999, surface soil samples were collected in and around the former 1100 Area in north Richland. A total of 16 samples from 12 locations were collected by staff from WDOH and PNNL and submitted to analytical laboratories for analysis. Ten of the sampling locations were selected by RL staff and were thought to have the greatest potential to have received contamination over the years. Two sites near the 1100 Area were selected by WDOH and PNNL as background locations (relatively undisturbed areas unaffected by Hanford operations). Four samples were collected by PNNL, four were collected by WDOH, and four were collected jointly and each was split between the two agencies (see Table 1). Ten of the locations were sampled on the afternoon of July 13, 1999. The remaining two locations were sampled by PNNL staff the morning of July 14, 1999. The eight samples obtained by each agency were submitted to separate analytical labs for analysis. Quanterra, Inc. in Richland analyzed PNNL samples, and the Washington State Public Health Laboratory in Seattle analyzed WDOH samples.

Sample labels and chain-of-custody paperwork were prepared for both WDOH and PNNL samples by PNNL prior to sampling. Samples were collected using procedures outlined in PNL-MA-580, *Surface Environmental Surveillance Procedures Manual*. Section 5.1 of these procedures specified that samples would consist of 5 cores, each measuring 2.5 cm deep by 10 cm in diameter, collected at least 10 paces apart within the desired sampling area. Samples were collected with a shallow coring device (known as a cookie-cutter) and a trowel. The five soil cores for each sample were poured into a single plastic bag. This bag was sealed and placed into another plastic bag with the sample label positioned between the two bags. Each split sample

consisted of 10 soil cores that were collected as described above. Two homogeneous samples were generated from the 10 cores by passing the mixed soil through a riffle splitter.

Sampling locations were arbitrarily numbered 1 through 12. Global positioning system (GPS) readings were taken at each location at the time of collection. However, the readings proved to be unreliable and additional GPS measurements were obtained on September 28 at the same sampling locations. These data were electronically plotted on a map of the sampling area (see attached figure). The station numbers and corresponding GPS coordinates are provided in Table 1. A short description of each sampling location is included in Table 2.

Table 1. GPS Coordinates, Sampling Locations, and Agencies Responsible for Soil Samples Collected in and Around the 1100 Area

Location Number	Coordinates[a]		Location	Responsible Agency
1	N110897	E593377	1100 Area	WDOH
2	N110533	E593430	1100 Area	WDOH
3	N110285	E593182	1100 Area	Split sample
4	N111358	E593621	1100 Area	Split sample
5	N112333	E593600	1100 Area	PNNL
6	N110847	E593431	1100 Area	WDOH
7	N111482	E593284	1100 Area	WDOH
8	N113649	E592858	1100 Area	Split sample
9	N113286	E592861	1100 Area	PNNL
10	N110516	E593398	1100 Area	PNNL
11	N111890	E593804	Background	Split sample
12	N112110	E594325	Background	PNNL

(a) NAD 1983 Conus Washington State 4602 meters

Table 2. Descriptions of 1100 Area Soil Sampling Locations

Station Number	Station Description
1	West of the 1175 and 1176 Buildings, east of the railroad tracks.
2	West of the south end of the grassy swale, on the east side of the first set of railroad tracks.
3	Outside the fence on the west side of the excess equipment storage yard which is located west of the railroad tracks.
4	Just west of Stevens Drive, north of the 1171 Building.
5	West of Stevens Drive, north of the electrical substation, between converging railroad tracks.
6	In grassy swale, west side, at the north end.
7	North of the 1171 Building, between railroad tracks, just south of dirt road crossing the tracks.
8	Off of north/south gravel road, directly east of the Siemans complex, east side of road.
9	Off of north/south gravel road, east side of road, southeast of the Siemans complex.
10	In the depression between the railroad tracks and the west side of the grassy swale, at the south end of the swale, near the north end of a drainage culvert.
11	East side of Stevens Drive, north of the 1171 Building, across from the electrical substation (a background station).
12	Across the road bordering the south side of the RTL Building, south of entrance to maintenance shops (a background station).

Samples were analyzed for strontium-90, uranium isotopes (uranium-234, -235, and –238), plutonium isotopes (plutonium-238 and –239/240), and gamma emitters (beryllium-7, potassium-40, cobalt-60, ruthenium-106, antimony-125, cesium-134 and -137, europium-154 and europium–155. Americium is not expected to be present separate from plutonium, so the analysis for plutonium is sufficient for evaluating the levels of americium also.

Analytical Results

Analytical results for PNNL and WDOH are summarized in Table 3. This table includes data for radionuclides that could have originated at Hanford and are relatively persistent in the environment. Complete results for these and a number of other man-made and naturally occurring radionuclides (beryllium-7, potassium-40, cobalt-60, ruthenium-106, antimony-125, cesium-134, europium-154 and europium-155) are included in Tables 4 and 5.

Table 3. Concentrations of Selected Radionuclides in Surface Soil Samples (pCi/g, dry weight) Collected in and Near the 1100 Area in July 1999 and at Hanford Site Perimeter Locations in Previous Years

Radionuclide	Location	PNNL[a]			WDOH[b]			Perimeter Locations 1992-1997[c]	
		Maximum[d]	Minimum[d]	Mean[e]	Maximum[d]	Minimum[d]	Mean[e]	Mean[c]	Maximum[d]
Sr-90	1100 Area Background	0.115 ± 0.029 0.129 ± 0.031	0.0312 ± 0.01 0.020 ± 0.007	0.073 ± 0.028	0.11 ± 0.01 0.1 ± 0.01	0.003 ± 0.005	0.039 ± 0.028	0.078 ± 0.016	0.15 ± 0.032
Cs-137	1100 Area Background	0.55 ± 0.064 0.664 ± 0.076	0.143 ± 0.032 0.106 ± 0.027	0.343 ± 0.111	0.545 ± 0.034 0.655 ± 0.017	0.02 ± 0.007	0.202 ± 0.148	0.35 ± 0.095	0.95 ± 0.12
U-234	1100 Area Background	0.183 ± 0.039 0.147 ± 0.033	0.125 ± 0.029 0.109 ± 0.027	0.154 ± 0.019	0.75 ± 0.09 0.6 ± 0.1	0.49 ± 0.09	0.54 ± 0.072	0.535 ± 0.144	0.878 ± 0.110
U-235	1100 Area Background	0.011 ± 0.007 0.012 ± 0.008	0.003 ± 0.005 0.004 ± 0.005	0.008 ± 0.003	ND[f]	ND	ND	0.028 ± 0.030	0.269 ± 0.15
U-238	1100 Area Background	0.183 ± 0.039 0.15 ± 0.033	0.126 ± 0.029 0.142 ± 0.032	0.156 ± 0.019	0.7 ± 0.1 0.8 ± 0.1	0.54 ± 0.08	0.626 ± 0.052	0.71 ± 0.10	1.1 ± 0.51
Pu-238	1100 Area Background	0.0005 ± 0.0003 0.0006 ± 0.0004	0.0002 ± 0.0002 0.0001 ± 0.0001	0.0004 ± 0.0001	0.006 ± 0.005 0.0006 ± 0.0027	-0.0001 ± 0.0032	0.0022 ± 0.0018	0.0003 ± 0.0002	0.0011 ± 0.0013
Pu-239/240	1100 Area Background	0.025 ± 0.0043 0.0161 ± 0.0033	0.0033 ± 0.0008 0.0013 ± 0.0004	0.010 ± 0.006	0.016 ± 0.005 0.0123 ± 0.0051	0.0018 ± 0.0022	0.0051 ± 0.0038	0.0079 ± 0.002	0.021 ± 0.0029

(a) Includes data for 1100 Area locations 3, 4, 5, 8, 9, 10, and background locations 11 and 12.
(b) Includes data for 1100 Area locations 1, 2, 3, 4, 6, 7, 8, and background location 11.
(c) SESP analytical data.
(d) ± total propagated analytical uncertainty (2 sigma).
(e) ±2 standard error.
(f) No data provided.

Conclusion

In all cases, radionuclide concentrations in the 1100 Area soil samples were similar to concentrations measured in the background samples collected near the 1100 Area and were generally within the range of values measured at Hanford Site perimeter locations between 1992 and 1997 (see Table 3).

Table 4

PNNL Data (pCi/g, dry wt.) for 1100 Area Surface Soil Samples

SAMPLE LOCATION NUMBER	SAMPLE NUMBER	SAMPLE DATE	CONSTITUENT	VALUE REPORTED	COUNTING ERROR	TOTAL ANALYTICAL ERROR	SAMPLE SITE NAME
3	B0VYC5	13-Jul-99	CS-137	0.55	0.064	0.064	1100 AREA
4	B0VYC7	13-Jul-99	CS-137	0.274	0.037	0.037	1100 AREA
5	B0VYC9	13-Jul-99	CS-137	0.411	0.051	0.051	1100 AREA
6	B0VYD2	13-Jul-99	CS-137	0.336	0.047	0.047	1100 AREA
9	B0VYD4	14-Jul-99	CS-137	0.345	0.046	0.046	1100 AREA
10	B0VYD5	13-Jul-99	CS-137	0.143	0.032	0.032	1100 AREA
11	B0VYD6	13-Jul-99	CS-137	0.664	0.076	0.076	BACKGROUND
12	B0VYD8	14-Jul-99	CS-137	0.106	0.027	0.027	BACKGROUND
3	B0VYC5	13-Jul-99	SR-90	0.115	0.013	0.029	1100 AREA
4	B0VYC7	13-Jul-99	SR-90	0.0462	0.0079	0.013	1100 AREA
5	B0VYC9	13-Jul-99	SR-90	0.11	0.012	0.028	1100 AREA
6	B0VYD2	13-Jul-99	SR-90	0.0617	0.0096	0.017	1100 AREA
9	B0VYD4	14-Jul-99	SR-90	0.0749	0.0096	0.02	1100 AREA
10	B0VYD5	13-Jul-99	SR-90	0.0312	0.0069	0.01	1100 AREA
11	B0VYD6	13-Jul-99	SR-90	0.129	0.011	0.031	BACKGROUND
12	B0VYD8	14-Jul-99	SR-90	0.0198	0.0052	0.0074	BACKGROUND
3	B0VYC5	13-Jul-99	CO-60	0.00964	0.014	0.014	1100 AREA
4	B0VYC7	13-Jul-99	CO-60	0.000592	0.011	0.011	1100 AREA
5	B0VYC9	13-Jul-99	CO-60	0.00278	0.013	0.013	1100 AREA
6	B0VYD2	13-Jul-99	CO-60	0.00229	0.016	0.016	1100 AREA
9	B0VYD4	14-Jul-99	CO-60	0.00621	0.014	0.014	1100 AREA
10	B0VYD5	13-Jul-99	CO-60	0.0116	0.018	0.018	1100 AREA
11	B0VYD6	13-Jul-99	CO-60	0.000854	0.014	0.014	BACKGROUND
12	B0VYD8	14-Jul-99	CO-60	0.00124	0.013	0.013	BACKGROUND
3	B0VYC5	13-Jul-99	K-40	15.9	1.7	1.7	1100 AREA
4	B0VYC7	13-Jul-99	K-40	16.6	1.8	1.8	1100 AREA
5	B0VYC9	13-Jul-99	K-40	17	1.8	1.8	1100 AREA
6	B0VYD2	13-Jul-99	K-40	17.4	1.8	1.8	1100 AREA
9	B0VYD4	14-Jul-99	K-40	18	1.9	1.9	1100 AREA
10	B0VYD5	13-Jul-99	K-40	15.7	1.7	1.7	1100 AREA
11	B0VYD6	13-Jul-99	K-40	14.9	1.6	1.6	BACKGROUND
12	B0VYD8	14-Jul-99	K-40	16.1	1.7	1.7	BACKGROUND
3	B0VYC5	13-Jul-99	BE-7	0.0798	0.16	0.16	1100 AREA
4	B0VYC7	13-Jul-99	BE-7	0.0527	0.12	0.12	1100 AREA
5	B0VYC9	13-Jul-99	BE-7	0.0363	0.14	0.14	1100 AREA
6	B0VYD2	13-Jul-99	BE-7	0.154	0.17	0.17	1100 AREA
9	B0VYD4	14-Jul-99	BE-7	0.0416	0.14	0.14	1100 AREA
10	B0VYD5	13-Jul-99	BE-7	0.0507	0.19	0.19	1100 AREA
11	B0VYD6	13-Jul-99	BE-7	0.0453	0.15	0.15	BACKGROUND
12	B0VYD8	14-Jul-99	BE-7	0.163	0.14	0.14	BACKGROUND
3	B0VYC5	13-Jul-99	U-234	0.181	0.025	0.039	1100 AREA
4	B0VYC7	13-Jul-99	U-234	0.125	0.02	0.029	1100 AREA
5	B0VYC9	13-Jul-99	U-234	0.148	0.022	0.033	1100 AREA
6	B0VYD2	13-Jul-99	U-234	0.183	0.026	0.039	1100 AREA
9	B0VYD4	14-Jul-99	U-234	0.143	0.022	0.032	1100 AREA
10	B0VYD5	13-Jul-99	U-234	0.143	0.025	0.034	1100 AREA
11	B0VYD6	13-Jul-99	U-234	0.147	0.022	0.033	BACKGROUND
12	B0VYD8	14-Jul-99	U-234	0.109	0.019	0.027	BACKGROUND

Table 4 (contd)

PNNL Data (pCi/g, dry wt.) for 1100 Area Surface Soil Samples

SAMPLE LOCATION NUMBER	SAMPLE NUMBER	SAMPLE DATE	CONSTITUENT	VALUE REPORTED	COUNTING ERROR	TOTAL ANALYTICAL ERROR	SAMPLE SITE NAME
3	B0VYC5	13-Jul-99	RU-106	0.00384	0.11	0.11	1100 AREA
4	B0VYC7	13-Jul-99	RU-106	0.0696	0.092	0.092	1100 AREA
5	B0VYC9	13-Jul-99	RU-106	-0.0375	0.11	0.11	1100 AREA
6	B0VYD2	13-Jul-99	RU-106	0.0656	0.13	0.13	1100 AREA
9	B0VYD4	14-Jul-99	RU-106	-0.0499	0.11	0.11	1100 AREA
10	B0VYD5	13-Jul-99	RU-106	0.0761	0.14	0.14	1100 AREA
11	B0VYD6	13-Jul-99	RU-106	0.0439	0.11	0.11	BACKGROUND
12	B0VYD8	14-Jul-99	RU-106	-0.0247	0.11	0.11	BACKGROUND
3	B0VYC5	13-Jul-99	CS-134	0.00127	0.013	0.013	1100 AREA
4	B0VYC7	13-Jul-99	CS-134	-0.000536	0.011	0.011	1100 AREA
5	B0VYC9	13-Jul-99	CS-134	0.307	0.04	0.04	1100 AREA
6	B0VYD2	13-Jul-99	CS-134	0.021	0.016	0.016	1100 AREA
9	B0VYD4	14-Jul-99	CS-134	0.00216	0.014	0.014	1100 AREA
10	B0VYD5	13-Jul-99	CS-134	-0.00466	0.018	0.018	1100 AREA
11	B0VYD6	13-Jul-99	CS-134	0.00741	0.014	0.014	BACKGROUND
12	B0VYD8	14-Jul-99	CS-134	0.00695	0.013	0.013	BACKGROUND
3	B0VYC5	13-Jul-99	PU-238	0.000511	0.00023	0.00025	1100 AREA
4	B0VYC7	13-Jul-99	PU-238	0.000237	0.00014	0.00015	1100 AREA
5	B0VYC9	13-Jul-99	PU-238	0.000356	0.00018	0.0002	1100 AREA
6	B0VYD2	13-Jul-99	PU-238	0.000439	0.00022	0.00023	1100 AREA
9	B0VYD4	14-Jul-99	PU-238	0.000347	0.0002	0.00021	1100 AREA
10	B0VYD5	13-Jul-99	PU-238	0.000342	0.00018	0.00019	1100 AREA
11	B0VYD6	13-Jul-99	PU-238	0.000598	0.00038	0.0004	BACKGROUND
12	B0VYD8	14-Jul-99	PU-238	0.000108	0.000095	0.0001	BACKGROUND
3	B0VYC5	13-Jul-99	SB-125	-0.0124	0.031	0.031	1100 AREA
4	B0VYC7	13-Jul-99	SB-125	0.00705	0.028	0.028	1100 AREA
5	B0VYC9	13-Jul-99	SB-125	-0.0146	0.031	0.031	1100 AREA
6	B0VYD2	13-Jul-99	SB-125	0.00215	0.036	0.036	1100 AREA
9	B0VYD4	14-Jul-99	SB-125	0.0189	0.033	0.033	1100 AREA
10	B0VYD5	13-Jul-99	SB-125	-0.0114	0.039	0.039	1100 AREA
11	B0VYD6	13-Jul-99	SB-125	0.0071	0.032	0.032	BACKGROUND
12	B0VYD8	14-Jul-99	SB-125	-0.00362	0.03	0.03	BACKGROUND
3	B0VYC5	13-Jul-99	EU-155	0.075	0.039	0.039	1100 AREA
4	B0VYC7	13-Jul-99	EU-155	0.0844	0.047	0.047	1100 AREA
5	B0VYC9	13-Jul-99	EU-155	0.0341	0.032	0.032	1100 AREA
6	B0VYD2	13-Jul-99	EU-155	0.0374	0.043	0.043	1100 AREA
9	B0VYD4	14-Jul-99	EU-155	0.0105	0.041	0.041	1100 AREA
10	B0VYD5	13-Jul-99	EU-155	0.0523	0.052	0.052	1100 AREA
11	B0VYD6	13-Jul-99	EU-155	0.0146	0.039	0.039	BACKGROUND
12	B0VYD8	14-Jul-99	EU-155	-0.0209	0.043	0.043	BACKGROUND
3	B0VYC5	13-Jul-99	U-235	0.0109	0.0061	0.0072	1100 AREA
4	B0VYC7	13-Jul-99	U-235	0.00264	0.0028	0.0045	1100 AREA
5	B0VYC9	13-Jul-99	U-235	0.00892	0.0053	0.0064	1100 AREA
6	B0VYD2	13-Jul-99	U-235	0.0115	0.0063	0.0074	1100 AREA
9	B0VYD4	14-Jul-99	U-235	0.00626	0.0042	0.0054	1100 AREA
10	B0VYD5	13-Jul-99	U-235	0.00617	0.0049	0.0063	1100 AREA
11	B0VYD6	13-Jul-99	U-235	0.00394	0.0034	0.0049	BACKGROUND
12	B0VYD8	14-Jul-99	U-235	0.0122	0.0065	0.0076	BACKGROUND

Table 4 (contd)

PNNL Data (pCi/g, dry wt.) for 1100 Area Surface Soil Samples

SAMPLE LOCATION NUMBER	SAMPLE NUMBER	SAMPLE DATE	CONSTITUENT	VALUE REPORTED	COUNTING ERROR	TOTAL ANALYTICAL ERROR	SAMPLE SITE NAME
3	B0VYC5	13-Jul-99	EU-154	0.00157	0.041	0.041	1100 AREA
4	B0VYC7	13-Jul-99	EU-154	0.0132	0.038	0.038	1100 AREA
5	B0VYC9	13-Jul-99	EU-154	0.0162	0.041	0.041	1100 AREA
6	B0VYD2	13-Jul-99	EU-154	-0.0123	0.052	0.052	1100 AREA
9	B0VYD4	14-Jul-99	EU-154	0.0176	0.048	0.048	1100 AREA
10	B0VYD5	13-Jul-99	EU-154	0.00361	0.061	0.061	1100 AREA
11	B0VYD6	13-Jul-99	EU-154	-0.00842	0.044	0.044	BACKGROUND
12	B0VYD8	14-Jul-99	EU-154	-0.0226	0.045	0.045	BACKGROUND
3	B0VYC5	13-Jul-99	PU-239/240	0.025	0.0016	0.0043	1100 AREA
4	B0VYC7	13-Jul-99	PU-239/240	0.00564	0.00069	0.0011	1100 AREA
5	B0VYC9	13-Jul-99	PU-239/240	0.0111	0.001	0.002	1100 AREA
6	B0VYD2	13-Jul-99	PU-239/240	0.0074	0.00091	0.0015	1100 AREA
9	B0VYD4	14-Jul-99	PU-239/240	0.00792	0.0009	0.0016	1100 AREA
10	B0VYD5	13-Jul-99	PU-239/240	0.00333	0.00054	0.00076	1100 AREA
11	B0VYD6	13-Jul-99	PU-239/240	0.0161	0.0018	0.0033	BACKGROUND
12	B0VYD8	14-Jul-99	PU-239/240	0.00127	0.00032	0.00039	BACKGROUND
3	B0VYC5	13-Jul-99	U-238	0.183	0.026	0.039	1100 AREA
4	B0VYC7	13-Jul-99	U-238	0.126	0.021	0.029	1100 AREA
5	B0VYC9	13-Jul-99	U-238	0.158	0.023	0.034	1100 AREA
6	B0VYD2	13-Jul-99	U-238	0.176	0.025	0.037	1100 AREA
9	B0VYD4	14-Jul-99	U-238	0.133	0.021	0.03	1100 AREA
10	B0VYD5	13-Jul-99	U-238	0.16	0.026	0.036	1100 AREA
11	B0VYD6	13-Jul-99	U-238	0.142	0.022	0.032	BACKGROUND
12	B0VYD8	14-Jul-99	U-238	0.15	0.023	0.033	BACKGROUND

Table 5

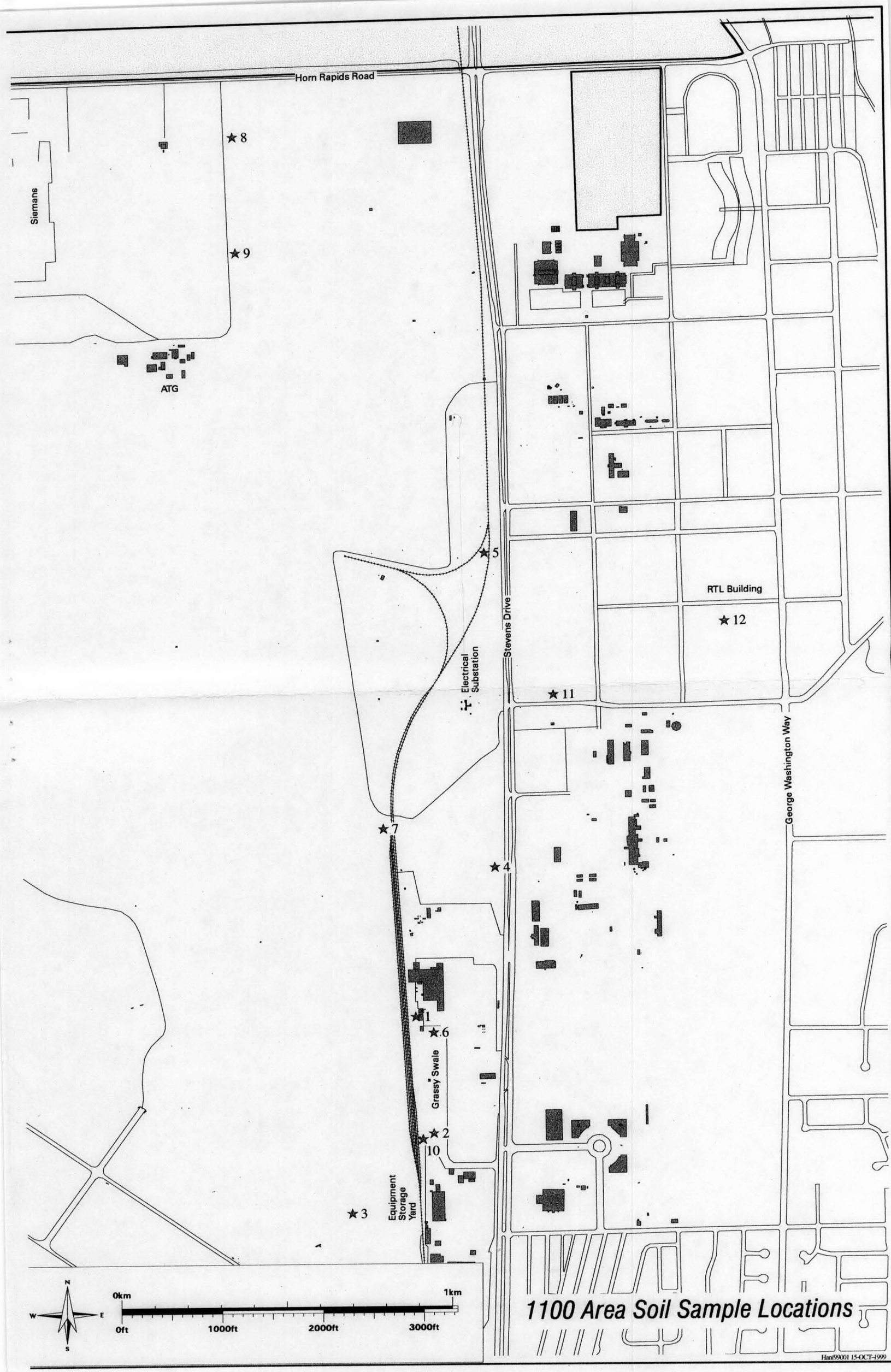
WDOH Data (pCi/g, dry wt.) for 1100 Area Surface Soil Samples

SAMPLE LOCATION NUMBER	SAMPLE NUMBER	SAMPLE DATE	CONSTITUENT	VALUE REPORTED	TOTAL ANALYTICAL ERROR	LOWER LEVEL OF DETECTION	SAMPLE SITE NAME
1	BOVYC3	13-Jul-99	Co-60	0.003	0.007	0.02	1100 AREA
2	BOVYC4	13-Jul-99	Co-60	0	0.006	0.02	1100 AREA
6	BOVYD0	13-Jul-99	Co-60	-0.001	0.004	0.02	1100 AREA
7	BOVYD1	13-Jul-99	Co-60	0.001	0.004	0.02	1100 AREA
3	BOVYC6	13-Jul-99	Co-60	0.001	0.007	0.02	1100 AREA
4	BOVYC8	13-Jul-99	Co-60	-0.002	0.007	0.02	1100 AREA
8	BOVYD3	13-Jul-99	Co-60	-0.002	0.004	0.02	1100 AREA
11	BOVYD7	13-Jul-99	Co-60	0.004	0.004	0.02	BACKGROUND
1	BOVYC3	13-Jul-99	Cs-137	0.091	0.016	0.02	1100 AREA
2	BOVYC4	13-Jul-99	Cs-137	0.093	0.014	0.02	1100 AREA
6	BOVYD0	13-Jul-99	Cs-137	0.02	0.007	0.02	1100 AREA
7	BOVYD1	13-Jul-99	Cs-137	0.04	0.008	0.02	1100 AREA
3	BOVYC6	13-Jul-99	Cs-137	0.545	0.034	0.02	1100 AREA
4	BOVYC8	13-Jul-99	Cs-137	0.265	0.022	0.02	1100 AREA
8	BOVYD3	13-Jul-99	Cs-137	0.362	0.012	0.02	1100 AREA
11	BOVYD7	13-Jul-99	Cs-137	0.655	0.017	0.02	BACKGROUND
3	BOVYC6	13-Jul-99	K-40	15.1	0.6	0.1	1100 AREA
4	BOVYC8	13-Jul-99	K-40	17.1	0.6	0.1	1100 AREA
8	BOVYD3	13-Jul-99	K-40	17.9	0.3	0.1	1100 AREA
11	BOVYD7	13-Jul-99	K-40	15.8	0.2	0.1	BACKGROUND
1	BOVYC3	13-Jul-99	PU-238	-0.0001	0.0032	0.03	1100 AREA
2	BOVYC4	13-Jul-99	PU-238	0.002	0.004	0.03	1100 AREA
6	BOVYD0	13-Jul-99	PU-238	0.002	0.002	0.03	1100 AREA
7	BOVYD1	13-Jul-99	PU-238	0.0003	0.0028	0.03	1100 AREA
3	BOVYC6	13-Jul-99	PU-238	0.005	0.006	0.03	1100 AREA
4	BOVYC8	13-Jul-99	PU-238	0.006	0.005	0.03	1100 AREA
8	BOVYD3	13-Jul-99	PU-238	0.00004	0.00152	0.03	1100 AREA
11	BOVYD7	13-Jul-99	PU-238	0.0006	0.0027	0.03	BACKGROUND
1	BOVYC3	13-Jul-99	Pu-239/240	0.0023	0.0025	0.006	1100 AREA
2	BOVYC4	13-Jul-99	Pu-239/240	0.003	0.003	0.006	1100 AREA
6	BOVYD0	13-Jul-99	Pu-239/240	0.002	0.002	0.006	1100 AREA
7	BOVYD1	13-Jul-99	Pu-239/240	0.0018	0.0022	0.006	1100 AREA
3	BOVYC6	13-Jul-99	Pu-239/240	0.004	0.004	0.006	1100 AREA
4	BOVYC8	13-Jul-99	Pu-239/240	0.016	0.005	0.006	1100 AREA
8	BOVYD3	13-Jul-99	Pu-239/240	0.00691	0.00268	0.006	1100 AREA
11	BOVYD7	13-Jul-99	Pu-239/240	0.0123	0.0051	0.006	BACKGROUND
1	BOVYC3	13-Jul-99	Sr-90	0.0028	0.005	0.005	1100 AREA
2	BOVYC4	13-Jul-99	Sr-90	0.022	0.005	0.005	1100 AREA
6	BOVYD0	13-Jul-99	Sr-90	0.0067	0.0043	0.005	1100 AREA
7	BOVYD1	13-Jul-99	Sr-90	0.018	0.004	0.005	1100 AREA
3	BOVYC6	13-Jul-99	Sr-90	0.11	0.01	0.005	1100 AREA
4	BOVYC8	13-Jul-99	Sr-90	0.048	0.006	0.005	1100 AREA
8	BOVYD3	13-Jul-99	Sr-90	0.064	0.007	0.005	1100 AREA
11	BOVYD7	13-Jul-99	Sr-90	0.1	0.01	0.005	BACKGROUND

Table 5 (contd)

WDOH Data (pCi/g, dry wt.) for 1100 Area Surface Soil Samples

SAMPLE LOCATION NUMBER	SAMPLE NUMBER	SAMPLE DATE	CONSTITUENT	VALUE REPORTED	TOTAL ANALYTICAL ERROR	LOWER LEVEL OF DETECTION	SAMPLE SITE NAME
1	BOVYC3	13-Jul-99	Total U	1.01	0.12	0.2	1100 AREA
2	BOVYC4	13-Jul-99	Total U	1	0.12	0.2	1100 AREA
6	BOVYD0	13-Jul-99	Total U	1.03	0.13	0.2	1100 AREA
7	BOVYD1	13-Jul-99	Total U	1.03	0.13	0.2	1100 AREA
3	BOVYC6	13-Jul-99	Total U	1.46	0.12	0.2	1100 AREA
4	BOVYC8	13-Jul-99	Total U	1.18	0.13	0.2	1100 AREA
8	BOVYD3	13-Jul-99	Total U	1.1	0.2	0.2	1100 AREA
11	BOVYD7	13-Jul-99	Total U	1.3	0.2	0.2	BACKGROUND
1	BOVYC3	13-Jul-99	U-234	0.49	0.08	0.005	1100 AREA
2	BOVYC4	13-Jul-99	U-234	0.5	0.08	0.005	1100 AREA
6	BOVYD0	13-Jul-99	U-234	0.5	0.09	0.005	1100 AREA
7	BOVYD1	13-Jul-99	U-234	0.49	0.09	0.005	1100 AREA
3	BOVYC6	13-Jul-99	U-234	0.75	0.09	0.005	1100 AREA
4	BOVYC8	13-Jul-99	U-234	0.55	0.09	0.005	1100 AREA
8	BOVYD3	13-Jul-99	U-234	0.5	0.1	0.005	1100 AREA
11	BOVYD7	13-Jul-99	U-234	0.6	0.1	0.005	BACKGROUND
1	BOVYC3	13-Jul-99	U-238	0.54	0.08	0.003	1100 AREA
2	BOVYC4	13-Jul-99	U-238	0.58	0.08	0.003	1100 AREA
6	BOVYD0	13-Jul-99	U-238	0.63	0.08	0.003	1100 AREA
7	BOVYD1	13-Jul-99	U-238	0.55	0.09	0.003	1100 AREA
3	BOVYC6	13-Jul-99	U-238	0.69	0.08	0.003	1100 AREA
4	BOVYC8	13-Jul-99	U-238	0.69	0.09	0.003	1100 AREA
8	BOVYD3	13-Jul-99	U-238	0.7	0.1	0.003	1100 AREA
11	BOVYD7	13-Jul-99	U-238	0.8	0.1	0.003	BACKGROUND


Horn Rapids Road
Siemans
ATG
8
9
5
7
4
1
6
2
10
3
12
11
Electrical Substation
Stevens Drive
RTL Building
George Washington Way
Grassy Swale
Equipment Storage Yard
N
W
E
S
0km
1km
0ft
1000ft
2000ft
3000ft
1100 Area Soil Sample Locations
Hanf99001 15-OCT-1999