
Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-AC05-81OR20722

**POST-REMEDIAL ACTION REPORT FOR
THE BALLOD ASSOCIATES PROPERTY**

Rochelle Park, New Jersey

November 1985



**Bechtel National, Inc.
Advanced Technology Division**

POST-REMEDIAL ACTION REPORT
FOR THE
BALLOD ASSOCIATES PROPERTY
ROCHELLE PARK, NEW JERSEY

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ABBREVIATIONS

dpm*	disintegrations per minute
g	gram
h	hour
uR	microroentgens
uCi/ml	microcuries per milliliter
mrad	millirad
mrem	millirem
Pi	picocurie
WL	working level
yr	year

*Words appearing in boldfaced print are explained in the glossary.

1.0 INTRODUCTION

The purpose of this report is to document Bechtel National, Inc.'s (BNI) post-remedial action sampling on the Ballod Associates property in the vicinity of the Stepan Company plant in Maywood, New Jersey. This report briefly describes the origin of the radioactive contamination on the property, the methods used to determine the extent of it, and the type of remedial action performed. It also provides the guidelines used in performing the remedial action, data on the current radiological status of the property, and final excavation limits and depths.

Background

From about 1902 until 1956, Maywood Chemical Works extracted thorium compounds and rare earths from monazite. One use of the processed thorium was to manufacture mantles for gas lanterns. Stepan Company acquired the site in 1959. In 1984, Congress directed the Department of Energy (DOE) to initiate a research and development effort for the decontamination project involving the site and vicinity properties in Maywood. The Maywood site and vicinity properties, including the Ballod property, were assigned to the Formerly Utilized Sites Remedial Action Program (FUSRAP): a DOE effort to identify, decontaminate, or otherwise control sites where low-level radioactive contamination (exceeding current guidelines) remains from the early days of the nation's atomic energy program. (Although the contamination in Maywood and at the Ballod property did not result from the atomic energy program, the site was included as part of FUSRAP by Congress.) FUSRAP is currently being managed by DOE's Oak Ridge Operations Office. BNI is the Project Management Contractor and acts as DOE's representative in the planning, management, and implementation of FUSRAP.

During the period when the Maywood Chemical Works was processing thorium, waste sludges were pumped into settling lagoons. Two of these areas were located on the Ballod property (Figure 1). After purchase by Stepan Company, wastes were removed from the southern

diked area and the property was released for unrestricted use by the Atomic Energy Commission. The presence of waste in the northeast corner of the site was unknown at that time. Elevated radiation levels on the property were reported to the Nuclear Regulatory Commission (NRC) in 1980. The NRC performed a survey of the Ballod property through Oak Ridge Associated Universities in February 1981 (Ref. 1). Another radiological survey was commissioned by Stepan Company and performed by Nuclear Safety Associates, Inc. (Ref. 2). These two surveys indicated the presence of radioactive contamination above DOE guidelines and were used for initial design work. Bechtel National, Inc., further defined contamination boundaries in June 1985 so that final design engineering work could be conducted (Ref. 3).

2.0 REMEDIAL ACTION GUIDELINES

The radioactive contamination on the Ballod property consists primarily of thorium-232, with radium-226 and uranium concentrations slightly exceeding guidelines. Table 1 (Ref. 4) lists the DOE guidelines for residual contamination. DOE implemented these guidelines on the basis of their compatibility with the criteria used by the Environmental Protection Agency (EPA) (Ref. 5). If these guidelines are exceeded, contaminated soil is removed from the property until concentrations are within guidelines. Once the guidelines have been met, the property can be released for unrestricted use.

3.0 REMEDIAL ACTION

After a property was determined to be contaminated based on the radiological surveys, DOE "designated" the property for remedial action. This means that the property was contaminated above DOE guidelines and the contamination would be cleaned up. The owners were notified at this time, and BNI began the engineering design and related activities to hire local subcontractors to perform the cleanup work (Ref. 6).

Cleanup/Decontamination Activities

When the design work had been completed and a local subcontractor hired, drawings showing the extent of the contamination in the soil on the property were given to the excavation subcontractor.

Figure 2 shows the areas excavated in fiscal year 1985. (Remedial action will be performed on the area north of the railroad track in the future.) The subcontractor removed the soil as indicated in the engineering drawings, placed it in watertight dump trucks, and transported it to the storage pile on the Maywood Interim Storage Site (MISS) which is adjacent to Stepan Company plant. The soil will be stored at the MISS until a permanent disposal site is selected for this material.

Contamination Control During the Cleanup

During the cleanup, several controls were implemented to control the radioactive materials being removed from the Ballod property. These controls were designed to keep workers and nearby residents from being exposed to radiation above the standards during the cleanup.

The primary pathway by which residents could be exposed to radiation would be from dust released during the excavation. To avoid this, the subcontractor was required to keep all excavations and work areas free from dust by keeping the soil moistened.

To keep uncontaminated areas clean during excavation work, trucks were draped with tarpaulins before they were loaded. This kept the contaminated dirt from getting on the truck exterior and later falling off onto clean property. If the truck was parked on a clean area while it was being loaded, the ground was also covered with a tarpaulin and the truck pulled onto it before loading. If contaminated soil was spilled during the loading of the truck, the tarpaulin prevented the contamination of clean ground. Finally, the radioactive soil loaded on the trucks was covered before the soil was hauled away. This also prevented soil from falling out of the truck onto clean ground.

The combination of these measures resulted in control of the contamination and prevented its spread onto areas accessible to the general public. Continuous air sampling was performed at the perimeter of the site during excavation to monitor the presence of radionuclides in the air. The average concentration of the 70 air samples taken was 0.001×10^{-12} uCi/ml. None of the measurements indicated a concentration exceeding the DOE standard for thorium-232 (1.0×10^{-12} uCi/ml).

4.0 POST-REMEDIAL ACTION SAMPLING

After the radioactively contaminated soil was removed, another radiological survey was conducted to ensure that the property was indeed clean (no radionuclide concentrations in excess of the DOE criteria). This survey used several techniques and was applied to the sides and bottom of the excavations.

Surface Gamma Radiation Scans - To measure radionuclide concentrations in the soil against DOE criteria using gamma radiation survey data, it is necessary to correlate counts per minute (as measured by the radiation detector) to soil concentrations (as expressed in DOE guidelines). The calibration is determined by placing the detector above an area where the level of contamination is known and observing the number of counts per minute corresponding with the respective level of contamination. Two types of gamma radiation scans were conducted to determine whether all radioactively contaminated soil had been removed.

The first gamma survey was a "walkover" scan. In conducting this type of survey, the surveyor holds the radiation detector a few inches above the surface and slowly moves it back and forth above

the surface of the ground as he walks over the excavated area. The purpose of performing a walkover scan is to quickly detect areas of residual contamination. The advantage of this type of survey is that the detector quickly scans the area as the excavation proceeds.

The second gamma radiation scan was performed after all contamination detected by the walkover scan was removed. This survey used a lead shielded detector to ensure that the only radiation detected was coming from the ground under the detector. Measurements were made approximately every 8 feet in the excavated areas to ensure that the property had been cleaned of radioactively contaminated soils.

If either of these gamma radiation scans detected contamination in excess of the DOE guidelines, additional soil was removed. Both types of scans were repeated after the soil was removed, and this process was repeated until DOE guidelines were met.

Soil Sampling - The primary method of ensuring that the DOE cleanup guidelines were met was to take soil samples. Samples were taken every 16 feet from the bottoms of the excavations to ensure that the excavation was deep enough to remove contamination in excess of the guidelines. Samples were also taken from the sides of the deep excavations to ensure that the horizontal boundaries of contamination were correct. These samples were analyzed in the laboratory to determine the concentration of radium-226, thorium-232, and uranium-238. Soil sampling locations are shown in Figure 3.

Exposure Rate Measurements

Pressurized ionization chamber (PIC) readings were taken to measure the gamma radiation exposure rate after removal of the contamination. The PIC was set up at the locations shown in Figure 4. The measured gamma radiation exposure rates are reported in Table 2. For comparison, the DOE radiation protection standard

is 100 mrem/yr above the background radiation level. The values in Table 2 were calculated from the measured exposure rate and assume continuous exposure. A background contribution of 100 mrem/yr has been subtracted from these values.

5.0 POST-REMEDIAL ACTION STATUS

As shown in Table 3, the soil samples taken after removing the radioactive materials show that there is no area where radioactive contamination still exists in excess of the remedial action guidelines established by DOE. An independent assessment of the remedial action and related activities on Parcels Block 18, Lot 1 and Block 19A, Lot 1 at the Ballod property, Rochelle Park, New Jersey, has been accomplished by the Oak Ridge National Laboratory, Radiological Survey Activities Group. The purpose of the assessment was to verify the data supporting the adequacy of the remedial action and to confirm the site's compliance with remedial action criteria.

Based on all data collected, these parcels on the Ballod property conform to all applicable DOE radiological guidelines established for release of this site for unrestricted use.

In addition to the surveys that have been performed on behalf of DOE, measures have been taken by the New Jersey Department of Environmental Protection (NJDEP) to monitor remedial action activities. These measures include observing on-site operations and procedures, and analyzing archived soil samples.

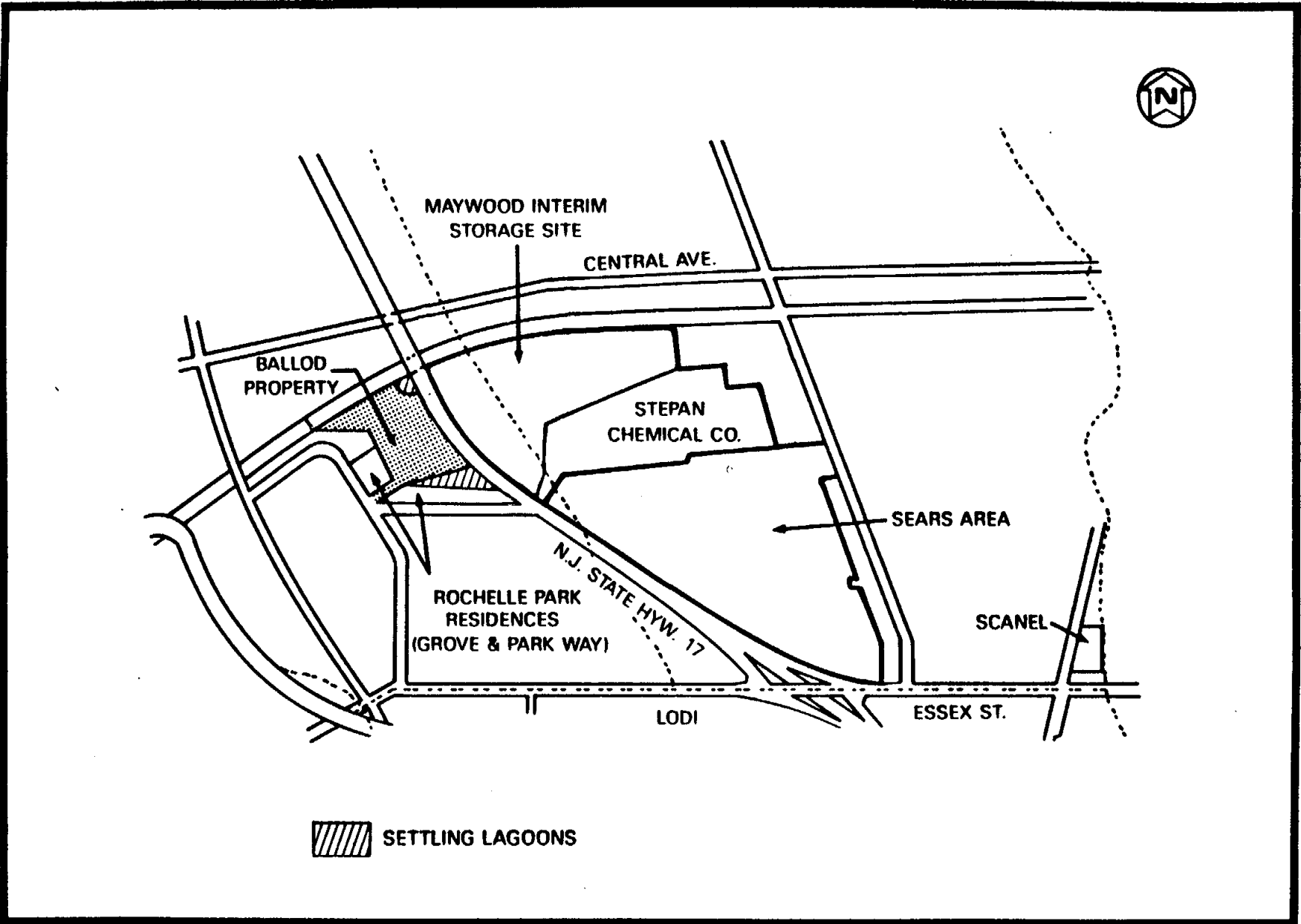


FIGURE 1 MAP OF BALLOD PROPERTY AND SURROUNDING AREA

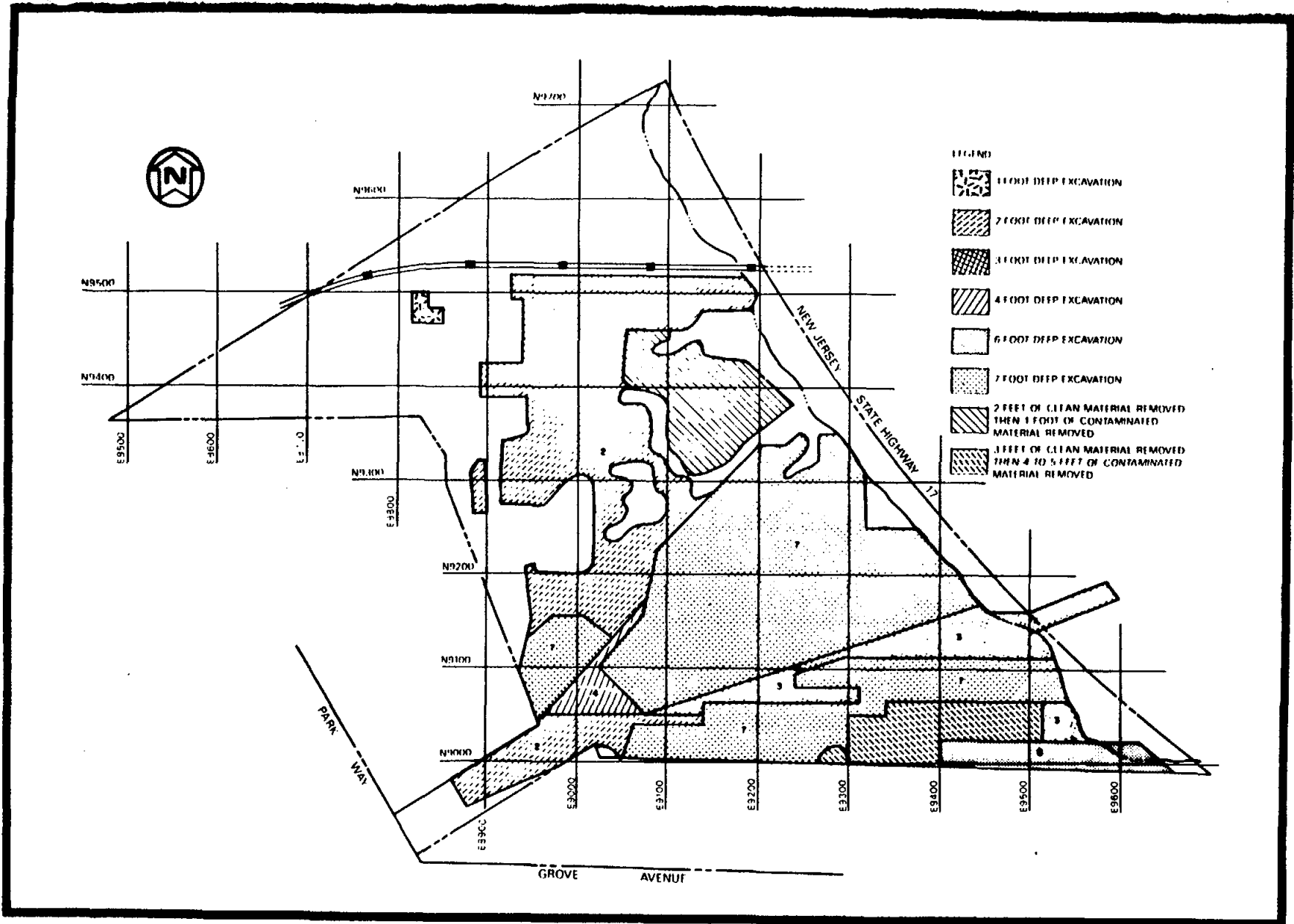


FIGURE 2 EXCAVATION BOUNDARIES ON BALLOD PROPERTY.

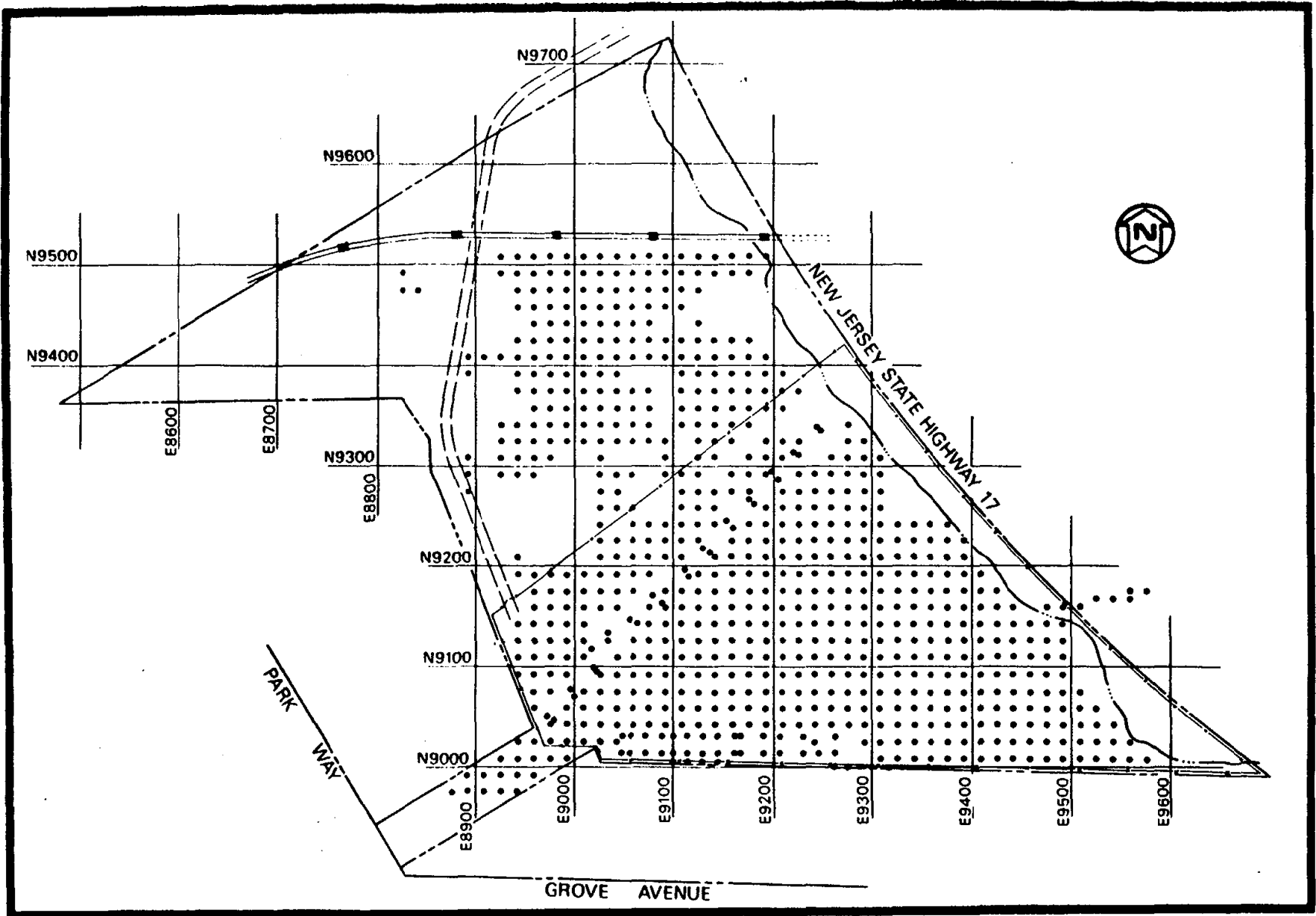


FIGURE 3 POST-REMEDIAL ACTION SAMPLING LOCATIONS

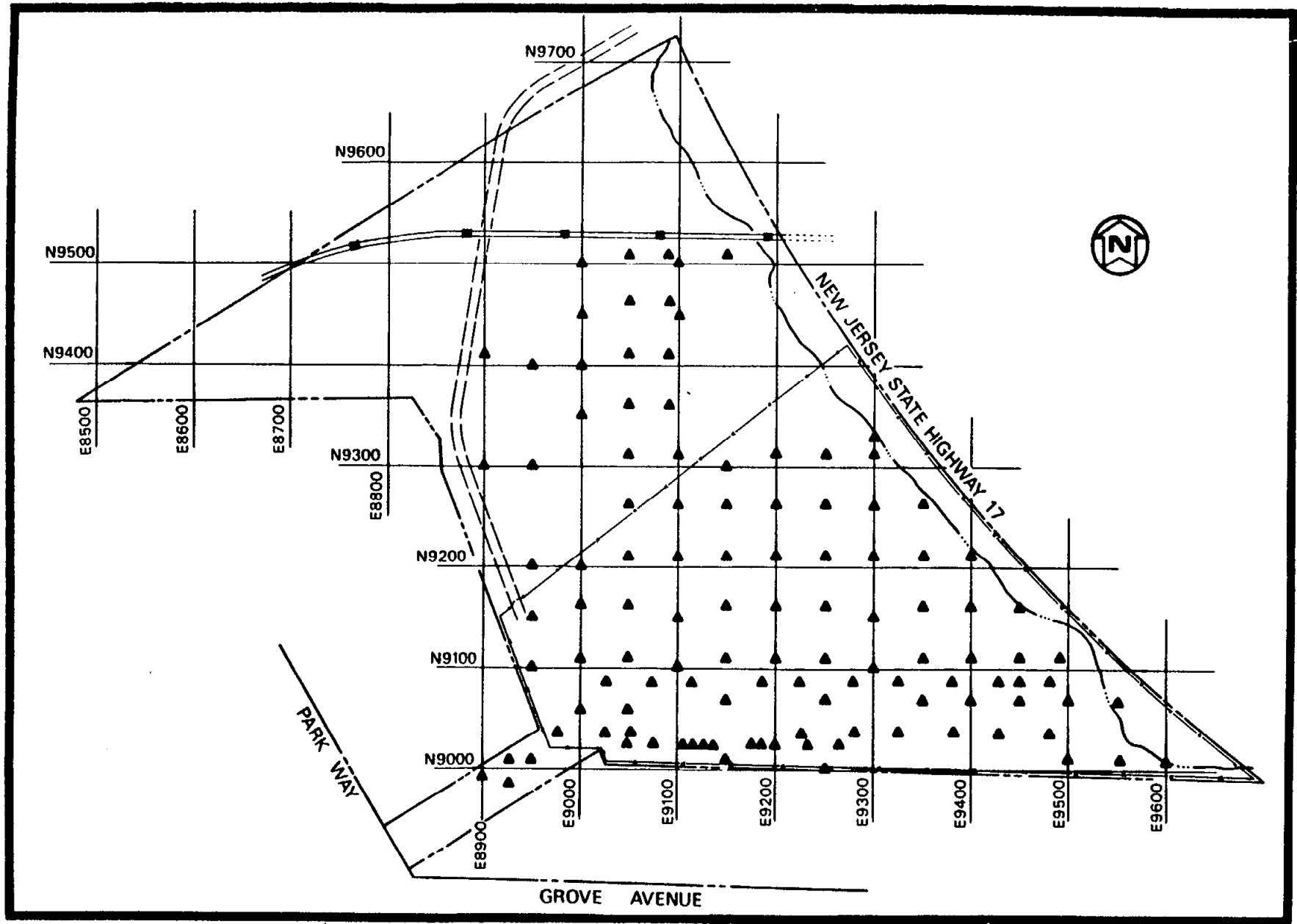


FIGURE 4 POST-REMEDIATION ACTION GAMMA RADIATION EXPOSURE RATE MEASUREMENT LOCATIONS

TABLE I

SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES

BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 500 mrem/yr for a period of exposure not to exceed 5 years and an average of 100 mrem/yr over a lifetime.

SOIL (LAND) GUIDELINES (MAXIMUM LIMITS FOR UNRESTRICTED USE)

<u>Radionuclide</u>	<u>Soil Concentration (pCi/g) above background^{a,b,c}</u>
Radium-226	5 pCi/g, averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over any 15-cm-thick soil layer below the surface layer.
Radium-228	
Thorium-230	
Thorium-232	
Other radionuclides	Soil guidelines will be calculated on a site-specific basis using the DOE manual developed for this use.

STRUCTURE GUIDELINES (MAXIMUM LIMITS FOR UNRESTRICTED USE)Airborne Radon Decay Products

Generic guidelines for concentrations of airborne radon decay products shall apply to existing occupied or habitable structures on private property that are intended for unrestricted use; structures that will be demolished or buried are excluded. The applicable generic guideline (40 CFR 192) is: In any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL.^d In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL. Remedial actions are not required in order to comply with this guideline when there is reasonable assurance that residual radioactive materials are not the cause.

Indoor/Outdoor Structure Surface Contamination

<u>Radionuclide^f</u>	<u>Allowable Surface Residual Contamination^g</u> (dpm/100 cm ²)		
	<u>Average^{g,h}</u>	<u>Maximum^g</u>	<u>Removable^g</u>
Transuranics, Ra-226, Ra-228, Th-230, Th-232, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay products	5,000	15,000	1,000

TABLE I
(Continued)

Indoor/Outdoor Structure Surface Contamination (continued)

<u>Radionuclide^f</u>	<u>Allowable Surface Residual Contamination^g</u> (dpm/100 cm ²)		
	<u>Average^{g,h}</u>	<u>Maximum^{g,i}</u>	<u>Removable^{g,j}</u>
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000	15,000	1,000

^gIn the event of occurrence of mixtures of radionuclides, the fraction contributed by each radionuclide to its limit shall be determined, and the sum of these fractions shall not exceed 1.

These guidelines represent unrestricted-use residual concentrations above background averaged across any 15-cm thick layer to any depth and over any contiguous 100-m² surface area.

^cLocalized concentrations in excess of these limits are allowable provided that the average over 100 m² is not exceeded.

^dA working level (WL) is any combination of short-lived radon decay products in 1 liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha energy.

^eAs used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^fWhere surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides shall apply independently.

^gMeasurements of average contamination should not be averaged over more than 1 m². For objects of less surface area, the average shall be derived for each such object.

^hThe average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h at 1 cm and 1.0 mrad/h at 1 cm respectively, measured through not more than 7 mg/cm² of total absorber.

ⁱThe maximum contamination level applies to an area of not more than 100 cm².

^jThe amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. The numbers in this column are maximum amounts.

TABLE 2
 GAMMA RADIATION EXPOSURE RATE
 MEASUREMENTS FOR THE
 BALLOD PROPERTY

Coordinates		mrem/yr*
East	North	
8900	8992	0
8900	9300	5
8900	9408	0
8925	8984	0
8925	9008	0
8950	9008	0
8950	9100	40
8950	9150	0
8950	9200	5
8950	9300	5
8950	9400	0
8975	9034	0
9000	9058	0
9000	9108	5
9000	9158	5
9000	9200	14
9000	9350	0
9000	9400	5
9000	9450	5
9000	9500	0
9025	9034	0
9025	9084	0
9045	9025	84
9050	9034	0
9050	9058	0
9050	9108	0
9050	9158	23
9050	9208	31
9050	9258	5
9050	9308	14
9050	9358	0
9050	9408	0
9050	9458	14
9050	9508	31
9075	9025	0
9075	9084	0
9092	9358	14
9092	9408	5
9092	9458	23
9092	9508	40

TABLE 2
(continued)

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Coordinates		mrem/yr*
East	North	
9100	9100	5
9100	9150	5
9100	9208	5
9100	9258	0
9100	9308	0
9100	9450	58
9100	9500	66
9105	9025	40
9117	9025	0
9117	9084	0
9120	9005	49
9135	9025	128
9150	9005	5
9150	9067	0
9150	9108	14
9150	9158	23
9150	9208	14
9150	9258	23
9150	9300	0
9150	9508	110
9170	9025	101
9175	9025	0
9175	9084	0
9200	9025	75
9200	9108	0
9200	9158	23
9200	9208	14
9200	9258	23
9200	9308	0
9225	9034	0
9225	9084	0
9230	9025	23
9245	9000	0
9250	9058	0
9250	9108	0
9250	9158	23
9250	9208	66
9250	9258	40
9250	9308	31
9260	9025	5
9275	9034	0
9275	9084	0
9300	9100	0
9300	9150	14
9300	9208	5

TABLE 2
(continued)

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Coordinates		mrem/yr*
East	North	
9300	9258	23
9300	9308	40
9300	9325	49
9325	9034	0
9325	9084	0
9350	9058	23
9350	9108	23
9350	9158	0
9350	9208	23
9350	9258	5
9375	9034	5
9375	9084	14
9400	9058	23
9400	9108	14
9400	9158	23
9400	9208	23
9425	9034	0
9425	9084	0
9450	9058	0
9450	9084	23
9450	9108	23
9450	9158	49
9475	9034	0
9475	9084	0
9492	9108	31
9500	9008	0
9500	9058	5
9550	9008	0
9550	9058	14
9600	9008	40

*Converted from uR/h measurements assuming continuous occupancy and a background contribution of 100 mrem/yr.

TABLE 3
 POST-REMEDIAL ACTION SAMPLING RESULTS
 BALLOD AND ASSOCIATES PROPERTY

<u>Coordinates</u>		<u>Concentrations (pCi/g +/- 1 sigma)</u>		
<u>East</u>	<u>North</u>	<u>Uranium-238</u>	<u>Radium-226</u>	<u>Thorium-232</u>
9492	9008	<1.4	0.5 + 0.2	0.8 + 0.5
9492	9025	<1.2	0.3 + 0.1	0.4 + 0.1
9492	9042	<1.6	0.5 + 0.1	0.9 + 0.5
9492	9058	0.7 + 0.3	0.6 + 0.1	1.0 + 0.2
9492	9075	<1.3	0.9 + 0.2	3.7 + 0.5
9492	9092	0.1 + 0.5	0.5 + 0.2	0.7 + 0.2
9475	9008	<1.9	1.3 + 0.2	6.5 + 4.0
9475	9025	<1.2	0.3 + 0.2	0.6 + 0.1
9475	9042	<1.4	0.5 + 0.1	1.7 + 1.0
9475	9058	1.9 + 1.5	0.8 + 0.2	4.3 + 0.5
9475	9075	<1.6	0.4 + 0.1	1.0 + 0.2
9475	9092	<1.2	0.3 + 0.1	0.4 + 0.2
9458	9008	<1.8	0.9 + 0.2	3.7 + 0.6
9458	9025	<1.8	0.8 + 0.1	4.0 + 2.8
9458	9042	<0.6	0.5 + 0.2	0.9 + 0.1
9458	9058	<1.6	0.5 + 0.1	0.8 + 0.3
9458	9075	<2.5	0.9 + 0.3	2.9 + 0.5
9458	9092	<3.2	0.4 + 0.4	1.6 + 1.1
9442	9008	<3.8	0.7 + 0.1	2.6 + 0.5
9442	9025	<2.4	0.7 + 0.2	3.1 + 0.8
9442	9042	<2.9	0.6 + 0.1	1.3 + 0.3
9442	9058	<3.5	0.8 + 0.1	2.1 + 0.7
9442	9075	<2.7	0.7 + 0.1	0.8 + 0.3
9442	9092	<2.2	0.7 + 0.1	0.7 + 0.1
9425	9008	<2.4	0.6 + 0.1	1.1 + 0.1
9425	9025	<2.2	0.3 + 0.1	0.4 + 0.2
9425	9042	<2.3	0.7 + 0.3	0.9 + 0.5
9425	9058	<2.8	0.5 + 0.3	1.2 + 0.2
9425	9075	<2.5	0.5 + 0.1	0.6 + 0.6
9425	9092	<2.2	0.5 + 0.2	0.7 + 0.5
9408	9008	<2.4	0.6 + 0.2	0.7 + 1.2
9408	9025	<2.0	0.2 + 0.1	0.3 + 0.2
9408	9042	0.8 + 0.7	0.6 + 0.1	1.1 + 0.2
9408	9058	2.6 + 1.7	0.8 + 0.2	2.2 + 0.2
9408	9075	<1.4	0.5 + 0.2	0.8 + 0.4
9408	9092	1.5 + 1.0	0.8 + 0.2	1.3 + 0.4
9392	9008	<0.8	0.5 + 0.2	0.7 + 0.2
9292	9025	<1.1	0.6 + 0.1	1.6 + 0.3
9392	9042	<1.2	1.7 + 0.4	7.4 + 0.3
9392	9058	1.4 + 1.7	1.2 + 0.3	4.8 + 1.1
9392	9075	<1.4	0.4 + 0.1	0.7 + 0.2
9392	9092	1.1 + 1.1	0.7 + 0.1	1.5 + 0.5
9375	9008	<1.7	1.2 + 0.3	5.2 + 0.6

TABLE 3

POST-REMEDIAL ACTION SAMPLING RESULTS
BALLOD AND ASSOCIATES PROPERTY

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9375	9025	<1.2	0.6 + 0.1	1.7 + 0.5
9375	9042	1.8 + 2.1	1.8 + 0.2	8.9 + 5.5
9375	9058	5.5 + 3.5	3.5 + 0.3	21.6 + 2.3
9375	9075	<2.2	1.5 + 0.3	8.3 + 0.5
9375	9092	<1.8	0.7 + 0.1	1.4 + 0.8
9358	9008	2.4 + 1.6	1.0 + 0.2	2.7 + 0.7
9358	9025	<1.4	0.9 + 0.2	3.2 + 0.8
9358	9042	3.1 + 0.8	1.7 + 0.4	9.3 + 1.3
9358	9058	1.7 + 1.2	0.8 + 0.1	2.3 + 0.6
9358	9075	1.8 + 1.7	1.4 + 0.1	6.3 + 0.9
9358	9092	0.9 + 1.1	0.7 + 0.2	1.5 + 0.5
9342	9008	2.8 + 1.1	0.6 + 0.1	1.3 + 0.6
9342	9025	1.7 + 2.5	2.7 + 0.3	15.8 + 1.6
9342	9042	<0.7	0.4 + 0.1	0.6 + 0.2
9342	9058	<0.7	0.6 + 0.1	1.7 + 0.4
9342	9075	<1.3	0.2 + 0.1	0.2 + 0.2
9342	9092	1.5 + 0.9	0.6 + 0.2	0.5 + 0.1
9325	9008	0.7 + 0.6	0.5 + 0.2	0.8 + 0.5
9325	9025	3.4 + 1.5	1.2 + 0.2	4.9 + 2.5
9325	9042	<4.5	1.4 + 0.2	6.3 + 0.4
9325	9058	<1.5	0.8 + 0.1	3.2 + 1.0
9325	9075	<1.3	0.3 + 0.1	0.6 + 0.3
9325	9092	<1.2	0.6 + 0.3	2.1 + 0.7
9308	9008	1.3 + 0.7	0.5 + 0.3	0.7 + 0.4
9308	9025	0.9 + 0.7	0.5 + 0.1	0.7 + 0.2
9308	9042	2.1 + 1.7	1.7 + 0.9	7.5 + 1.3
9308	9058	1.0 + 0.9	0.6 + 0.1	0.6 + 0.2
9308	9075	0.8 + 0.8	0.5 + 0.1	1.1 + 0.3
9308	9092	1.4 + 1.3	0.5 + 0.2	2.0 + 0.6
9292	9025	<1.7	0.9 + 0.1	4.9 + 1.3
9292	9042	0.7 + 0.9	0.6 + 0.2	1.5 + 0.5
9292	9058	<1.3	0.4 + 0.1	0.6 + 0.3
9292	9075	<1.3	0.3 + 0.1	0.4 + 0.1
9275	9042	<1.4	0.9 + 0.1	0.3 + 0.8
9275	9058	<1.1	0.2 + 0.1	0.3 + 0.1
9258	9042	<1.0	0.5 + 0.1	0.6 + 0.2
9258	9042	<1.1	0.6 + 0.1	1.2 + 0.4
9258	9075	<1.3	0.3 + 0.1	0.7 + 0.2
9242	9025	<1.0	0.7 + 0.2	0.7 + 0.1
9242	9042	<1.1	0.7 + 0.2	0.7 + 0.3
9242	9058	<0.8	0.3 + 0.1	0.5 + 0.2
9242	9075	<0.8	0.3 + 0.3	0.6 + 0.1
9225	9042	<1.4	1.0 + 0.1	1.4 + 0.1

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9225	9058	<0.8	0.9 + 0.3	1.4 + 0.2
9225	9075	<1.2	1.0 + 0.1	1.9 + 0.3
9208	9042	0.6 + 1.1	0.5 + 0.1	1.1 + 0.5
9208	9058	<0.8	0.5 + 0.1	0.7 + 0.2
9208	9075	<1.3	0.3 + 0.1	0.6 + 0.1
9192	9042	<1.4	0.4 + 0.1	0.7 + 0.2
9192	9058	<1.0	0.5 + 0.1	1.1 + 0.5
9192	9075	0.7 + 0.1	1.5 + 0.1	0.8 + 0.4
9175	9042	11.4 + 2.3	0.2 + 0.3	0.6 + 0.3
9175	9058	11.0 + 2.4	0.7 + 0.1	0.8 + 0.1
9175	9075	7.4 + 2.7	0.7 + 0.2	0.7 + 0.3
9175	9092	15.6 + 2.6	0.7 + 0.3	0.9 + 0.4
9158	9042	13.9 + 2.6	0.7 + 0.1	7.5 + 1.4
9158	9058	11.5 + 2.4	0.5 + 0.1	1.1 + 0.2
9158	9075	1.5 + 1.1	0.9 + 0.1	0.7 + 0.1
9158	9092	1.3 + 1.2	0.5 + 0.1	0.8 + 0.4
9142	9042	0.8 + 1.0	0.5 + 0.1	0.7 + 0.3
9142	9058	<1.1	0.6 + 0.1	0.9 + 0.4
9142	9075	1.3 + 0.9	0.6 + 0.2	0.8 + 0.2
9142	9092	2.9 + 1.1	0.9 + 0.2	0.8 + 0.3
9125	9042	<1.8	0.6 + 0.3	1.6 + 0.5
9125	9058	1.5 + 0.2	0.9 + 0.3	1.6 + 0.5
9125	9075	2.9 + 2.4	1.8 + 0.5	2.8 + 1.1
9125	9092	<1.6	0.5 + 0.2	0.8 + 0.3
9108	9042	<1.4	0.5 + 0.1	0.6 + 0.3
9108	9058	1.3 + 0.1	0.7 + 0.1	0.9 + 0.1
9108	9075	1.7 + 1.5	0.8 + 0.3	0.7 + 0.3
9092	9042	1.1 + 0.7	0.9 + 0.1	4.0 + 0.7
9092	9058	1.6 + 0.8	0.7 + 0.2	1.0 + 0.4
9092	9075	0.8 + 0.6	0.4 + 0.1	0.5 + 0.1
9075	9042	0.7 + 0.3	0.6 + 0.2	0.8 + 0.4
9075	9058	0.6 + 0.6	0.5 + 0.1	0.7 + 0.2
9075	9075	0.5 + 0.1	0.9 + 0.2	0.9 + 0.1
9058	9042	1.5 + 1.3	0.6 + 0.2	0.8 + 0.2
9058	9058	0.5 + 0.6	0.3 + 0.1	0.4 + 0.3
9058	9075	1.5 + 0.8	0.5 + 0.1	0.7 + 0.1
9042	9025	<2.1	0.5 + 0.2	0.8 + 0.2
9042	9042	<3.0	0.8 + 0.2	1.1 + 0.4
9042	9058	6.0 + 1.8	1.0 + 0.2	0.8 + 0.1
9042	9075	<2.7	0.6 + 0.1	0.4 + 0.2
9025	9025	<2.0	0.3 + 0.1	0.3 + 0.3
9025	9042	<2.3	0.5 + 0.1	0.7 + 0.3
9025	9058	<2.4	0.5 + 0.1	0.9 + 0.5

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<u>Coordinates</u>		<u>Concentrations (pCi/g +/- 1 sigma)</u>		
<u>East</u>	<u>North</u>	<u>Uranium-238</u>	<u>Radium-226</u>	<u>Thorium-232</u>
9025	9075	<1.9	0.4 ± 0.1	0.6 ± 0.3
9008	9025	<2.3	0.3 ± 0.1	0.4 ± 0.3
9008	9042	<2.5	0.4 ± 0.1	0.3 ± 0.3
9008	9058	<1.9	0.1 ± 0.2	<0.5
8992	9025	<2.0	0.3 ± 0.2	<0.6
8975	9025	<3.3	0.9 ± 0.1	1.6 ± 1.0
8958	9025	<2.8	0.5 ± 0.1	0.8 ± 0.3
8942	9025	<14.7	<2.2	<4.6
8992	9008	<2.7	0.5 ± 0.2	1.2 ± 0.3
8975	9008	3.0 ± 1.3	0.7 ± 0.1	0.6 ± 0.3
8958	9008	<7.7	0.9 ± 0.2	1.8 ± 0.9
8942	9008	<3.7	1.1 ± 0.6	2.0 ± 0.3
8925	9008	<2.4	0.5 ± 0.1	0.8 ± 0.1
8958	8992	<2.6	0.7 ± 0.2	1.6 ± 0.5
8942	8992	<2.5	0.5 ± 0.1	0.6 ± 0.1
8925	8992	<4.5	1.7 ± 0.7	2.1 ± 0.7
8908	8992	<2.5	0.4 ± 0.1	0.7 ± 0.7
8942	8975	<4.4	2.2 ± 0.9	2.5 ± 0.7
8925	8975	<3.2	0.6 ± 0.2	0.9 ± 0.8
8908	8975	<3.3	1.8 ± 0.6	1.7 ± 0.6
8875	8975	<2.5	0.4 ± 0.2	0.8 ± 0.5
8892	8975	<2.5	0.5 ± 0.1	0.6 ± 0.1
8892	8992	<1.4	0.8 ± 0.2	1.2 ± 0.5
9375	9125	<2.9	0.4 ± 0.2	0.6 ± 0.2
9358	9125	1.1 ± 0.1	0.4 ± 0.1	0.9 ± 0.5
9392	9125	1.5 ± 1.7	0.5 ± 0.1	0.8 ± 0.1
9408	9125	0.8 ± 0.7	0.6 ± 0.2	0.7 ± 0.2
9425	9125	<1.4	0.8 ± 0.2	1.9 ± 0.5
9442	9125	<1.1	0.5 ± 0.1	0.8 ± 0.2
9358	9142	1.6 ± 1.0	0.5 ± 0.1	0.9 ± 0.3
9375	9142	0.7 ± 0.1	0.6 ± 0.3	1.2 ± 0.2
9392	9142	0.7 ± 0.3	0.5 ± 0.1	0.6 ± 0.4
9408	9142	1.5 ± 1.0	0.7 ± 0.2	1.0 ± 0.2
9425	9142	1.7 ± 0.5	0.4 ± 0.1	0.5 ± 0.1
9442	9142	1.2 ± 0.8	0.5 ± 0.2	0.9 ± 0.3
9458	9142	1.0 ± 0.8	0.5 ± 0.1	0.6 ± 0.2
9358	9108	<0.8	0.5 ± 0.2	0.2 ± 0.1
9375	9108	<1.2	0.3 ± 0.1	0.4 ± 0.1
9392	9108	0.5 ± 0.6	0.2 ± 0.1	0.3 ± 0.1
9408	9108	0.8 ± 0.1	0.3 ± 0.1	0.6 ± 0.1
9425	9108	<1.7	0.3 ± 0.1	0.3 ± 0.1
9442	9108	<2.2	0.5 ± 0.1	0.6 ± 0.3
9458	9108	<1.8	0.3 ± 0.1	0.2 ± 0.3

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9475	9108	<2.6	0.7 + 0.1	0.9 + 0.5
9492	9108	<1.9	0.9 + 0.1	1.8 + 0.4
9192	9092	<2.6	0.5 + 0.2	0.4 + 0.1
9208	9092	<2.0	1.0 + 0.1	3.0 + 1.1
9225	9092	<2.4	0.3 + 0.1	0.7 + 0.4
9242	9092	<1.8	0.4 + 0.1	0.3 + 0.1
9275	9075	<1.7	0.3 + 0.1	0.3 + 0.1
9275	9058	<1.5	0.2 + 0.1	0.3 + 0.1
9358	9158	<1.8	0.2 + 0.1	0.4 + 0.1
9358	9175	<1.6	0.3 + 0.1	0.5 + 0.2
9358	9192	<1.5	0.2 + 0.1	0.5 + 0.1
9375	9158	<1.7	0.3 + 0.1	0.4 + 0.1
9375	9175	<1.2	0.3 + 0.1	0.6 + 0.1
9375	9192	<1.0	0.2 + 0.1	0.3 + 0.1
9392	9158	<1.2	0.3 + 0.1	0.4 + 0.2
9392	9175	<1.0	0.3 + 0.1	0.4 + 0.1
9392	9192	0.4 + 0.5	0.2 + 0.4	0.4 + 0.2
9408	9158	<1.1	0.4 + 0.1	0.5 + 0.2
9408	9175	<1.2	0.3 + 0.1	0.5 + 0.2
9408	9192	1.4 + 0.5	0.7 + 0.2	0.9 + 0.1
9425	9158	0.7 + 0.1	0.4 + 0.1	0.5 + 0.4
9425	9175	<1.8	0.8 + 0.2	3.6 + 0.4
9442	9158	1.3 + 0.7	0.5 + 0.1	0.8 + 0.2
9392	9225	0.8 + 0.4	0.5 + 0.1	0.7 + 0.3
9392	9208	<1.1	0.3 + 0.2	0.3 + 0.1
9375	9208	<1.1	0.2 + 0.1	0.3 + 0.1
9375	9225	0.7 + 0.5	0.2 + 0.1	0.4 + 0.1
9358	9175	<1.6	0.5 + 0.2	2.3 + 0.5
9358	9208	<1.6	0.3 + 0.1	0.4 + 0.1
9358	9242	<1.7	0.1 + 0.1	0.4 + 0.1
9342	9178	<1.5	0.3 + 0.1	0.7 + 0.5
9342	9208	<1.9	0.3 + 0.1	0.5 + 0.1
9342	9225	<1.7	0.4 + 0.1	0.6 + 0.3
9342	9242	<2.0	0.4 + 0.1	0.6 + 0.1
9325	9175	<1.7	0.3 + 0.3	0.3 + 0.1
9325	9192	<1.9	0.3 + 0.1	0.7 + 0.5
9325	9208	<2.1	0.4 + 0.1	0.5 + 0.1
9308	9150	<1.6	0.3 + 0.1	0.4 + 0.5
9308	9225	<1.5	0.3 + 0.1	0.6 + 0.1
9275	9092	<2.3	0.5 + 0.2	0.5 + 0.2
9258	9092	<2.2	0.5 + 0.1	0.4 + 0.2
9200	9092	<2.2	0.5 + 0.6	0.6 + 0.3
9375	9242	<6.0	0.5 + 0.1	0.4 + 0.3

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<u>Coordinates</u>		<u>Concentrations (pCi/g +/- 1 sigma)</u>		
<u>East</u>	<u>North</u>	<u>Uranium-238</u>	<u>Radium-226</u>	<u>Thorium-232</u>
9358	9225	<1.1	0.3 + 0.1	0.4 + 0.1
9258	9108	6.0 + 0.8	0.7 + 0.1	0.5 + 0.2
9275	9108	2.0 + 0.9	0.6 + 0.2	0.5 + 0.2
9292	9108	3.6 + 1.8	1.8 + 0.4	13.4 + 0.8
9308	9108	3.1 + 2.6	1.8 + 0.5	15.6 + 2.7
9325	9108	2.1 + 1.2	0.6 + 0.2	1.7 + 1.1
9342	9108	1.2 + 0.1	0.5 + 0.1	0.5 + 0.3
9258	9125	<1.5	0.5 + 0.1	0.6 + 0.2
9275	9125	5.3 + 1.6	1.4 + 0.2	1.7 + 1.0
9292	9125	1.4 + 0.2	0.8 + 0.1	1.0 + 0.2
9308	9125	0.6 + 0.6	0.4 + 0.1	0.4 + 0.2
9325	9125	0.8 + 0.1	0.7 + 0.2	1.2 + 0.6
9258	9142	<1.1	0.3 + 0.2	0.4 + 0.1
9275	9142	<3.2	0.5 + 0.1	3.7 + 0.7
9292	9142	<1.2	0.6 + 0.1	2.5 + 0.4
9308	9142	<0.8	0.3 + 0.1	0.6 + 0.3
9325	9142	<1.1	0.2 + 0.1	0.4 + 0.4
9342	9142	<1.3	0.3 + 0.1	0.4 + 0.2
9275	9242	1.5 + 1.1	0.3 + 0.1	2.4 + 0.5
9258	9258	<1.3	0.2 + 0.1	0.4 + 0.3
9275	9258	0.9 + 0.1	0.2 + 0.1	0.5 + 0.2
9292	9258	<1.1	0.1 + 0.1	0.4 + 0.1
9308	9258	<1.1	0.3 + 0.1	0.3 + 0.1
9258	9275	1.4 + 0.9	0.4 + 0.3	2.2 + 0.5
9275	9275	2.2 + 0.1	0.5 + 0.1	2.1 + 0.6
9292	9275	<1.0	0.2 + 0.1	0.7 + 0.2
9308	9275	<1.2	0.2 + 0.1	0.4 + 0.1
9258	9292	0.8 + 0.1	0.4 + 0.1	1.0 + 0.3
9275	9292	<1.8	0.3 + 0.1	0.5 + 0.4
9292	9292	<2.4	0.7 + 0.1	0.7 + 0.4
9308	9292	<1.5	0.2 + 0.1	0.5 + 0.1
9258	9308	<1.3	0.7 + 0.1	0.7 + 0.2
9275	9308	<9.1	0.9 + 0.4	1.1 + 0.4
9292	9308	<2.2	0.7 + 0.1	2.5 + 0.6
9308	9308	1.2 + 2.3	0.9 + 0.3	2.4 + 0.6
9275	9325	<2.1	0.7 + 0.1	1.6 + 0.6
9292	9325	<2.0	0.4 + 0.2	0.5 + 0.2
9275	9342	<2.6	0.9 + 0.2	0.8 + 0.5
9292	9092	<2.5	2.9 + 0.7	12.6 + 2.0
9258	9158	<2.2	0.5 + 0.2	1.0 + 0.4
9275	9158	<2.1	0.5 + 0.1	0.6 + 0.1
9292	9158	<1.6	0.3 + 0.1	0.4 + 0.1
9308	9158	<2.0	0.3 + 0.1	0.4 + 0.2

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9325	9158	<2.0	0.2 ± 0.1	0.7 ± 0.2
9342	9158	<2.3	0.3 ± 0.1	1.2 ± 0.3
9258	9175	<1.8	0.3 ± 0.1	0.4 ± 0.1
9275	9175	<2.1	0.2 ± 0.2	0.6 ± 0.3
9292	9175	<2.1	0.4 ± 0.2	1.0 ± 0.3
9308	9175	<2.1	0.3 ± 0.2	0.9 ± 0.5
9258	9192	0.9 ± 0.8	0.3 ± 0.2	0.7 ± 0.1
9275	9192	<2.0	0.4 ± 0.1	1.1 ± 0.8
9292	9192	<2.5	0.5 ± 0.1	0.9 ± 0.5
9308	9192	<1.1	0.3 ± 0.1	0.5 ± 0.2
9342	9192	<2.0	0.3 ± 0.2	0.8 ± 0.4
9258	9208	<2.4	0.4 ± 0.3	1.2 ± 0.5
9275	9208	<1.8	0.3 ± 0.3	0.4 ± 0.1
9292	9208	<1.6	0.3 ± 0.1	0.5 ± 0.1
9308	9208	<1.6	0.2 ± 0.1	0.4 ± 0.1
9258	9225	<1.0	0.3 ± 0.1	0.4 ± 0.1
9275	9225	0.6 ± 0.7	0.2 ± 0.1	0.4 ± 0.1
9292	9225	<1.1	0.2 ± 0.1	0.2 ± 0.1
9325	9225	<1.2	0.3 ± 0.1	0.4 ± 0.1
9258	9242	<1.2	0.3 ± 0.2	0.6 ± 0.2
9292	9242	1.2 ± 0.9	0.6 ± 0.1	1.1 ± 0.2
9308	9258	1.0 ± 0.8	0.3 ± 0.2	0.5 ± 0.1
9325	9242	<1.0	0.4 ± 0.1	0.6 ± 0.2
9458	9125	<1.2	0.3 ± 0.2	0.4 ± 0.3
9108	9108	1.4 ± 0.8	0.5 ± 0.2	0.9 ± 0.2
9125	9108	<0.9	0.5 ± 0.2	0.9 ± 0.4
9142	9108	<2.1	1.0 ± 0.3	4.5 ± 0.8
9158	9108	<1.5	0.5 ± 0.1	0.9 ± 0.1
9175	9108	1.8 ± 1.3	0.8 ± 0.2	0.5 ± 0.3
9192	9108	<1.2	0.6 ± 0.2	0.5 ± 0.2
9208	9108	1.0 ± 0.4	0.7 ± 0.1	0.9 ± 0.3
9225	9108	<1.3	0.4 ± 0.1	0.8 ± 0.1
9242	9108	1.1 ± 0.5	0.7 ± 0.1	0.6 ± 0.2
9192	9092	1.1 ± 0.8	0.5 ± 0.2	0.1 ± 1.8
9208	9092	5.0 ± 1.8	3.3 ± 0.4	25.0 ± 2.2
9108	9125	<1.8	0.6 ± 0.3	1.2 ± 0.4
9125	9125	<1.6	0.5 ± 0.3	1.1 ± 0.3
9142	9125	<0.8	0.7 ± 0.2	3.2 ± 0.5
9158	9125	<0.9	0.9 ± 0.2	3.3 ± 1.7
9175	9125	<1.5	0.7 ± 0.2	3.7 ± 0.7
9192	9125	<0.8	0.4 ± 0.1	0.8 ± 0.4
9208	9125	<1.5	0.5 ± 0.2	0.7 ± 0.1
9225	9125	1.1 ± 0.5	0.5 ± 0.2	1.0 ± 0.5

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9242	9125	<1.3	0.6 ± 0.2	2.3 ± 0.2
9108	9142	0.7 ± 0.6	0.6 ± 0.2	2.4 ± 1.2
9125	9142	<1.5	0.5 ± 0.2	0.9 ± 0.4
9142	9142	3.7 ± 1.1	1.3 ± 0.4	6.7 ± 4.0
9158	9142	<1.8	0.4 ± 0.3	0.7 ± 0.3
9175	9142	<1.7	0.3 ± 0.1	0.6 ± 0.3
9192	9142	<2.3	0.5 ± 0.1	0.8 ± 0.8
9208	9142	<2.1	0.6 ± 0.5	0.4 ± 0.3
9225	9142	<2.2	0.6 ± 0.1	0.8 ± 0.1
9242	9142	<2.3	0.5 ± 0.2	0.8 ± 0.5
9125	9158	<7.6	2.6 ± 0.4	18.1 ± 1.0
9142	9158	<2.5	1.4 ± 0.2	9.6 ± 3.4
9158	9158	<2.9	0.7 ± 0.3	1.7 ± 0.3
9175	9158	<1.7	0.3 ± 0.1	0.4 ± 0.3
9192	9158	<1.7	0.3 ± 0.1	6.2 ± 0.1
9208	9158	<1.9	0.3 ± 0.1	0.5 ± 0.3
9058	9092	<2.0	0.3 ± 0.1	0.3 ± 0.3
9075	9092	<2.6	0.6 ± 0.1	1.3 ± 0.4
9092	9092	<2.4	0.6 ± 0.1	0.9 ± 0.2
9108	9092	<1.8	0.4 ± 0.1	0.4 ± 0.3
9208	9158	<2.3	0.5 ± 0.1	0.8 ± 0.2
9225	9158	<2.4	0.5 ± 0.2	0.9 ± 0.3
9242	9158	<3.1	0.3 ± 0.2	2.2 ± 1.2
9125	9175	<4.9	2.0 ± 2.0	18.0 ± 2.0
9142	9175	<2.1	0.4 ± 0.1	1.0 ± 0.6
9158	9175	<2.1	0.4 ± 0.1	0.8 ± 0.1
9175	9175	<1.8	0.2 ± 0.2	0.3 ± 0.1
9192	9175	<1.9	0.4 ± 0.1	0.5 ± 0.1
9208	9175	<2.0	0.3 ± 0.2	0.7 ± 0.2
9225	9175	<2.3	0.8 ± 0.3	5.5 ± 1.2
9242	9175	<2.0	0.4 ± 0.1	0.5 ± 0.4
9175	9192	<1.8	0.4 ± 0.1	0.5 ± 0.2
9192	9192	<1.8	0.3 ± 0.1	0.4 ± 0.1
9208	9192	<1.5	0.3 ± 0.1	0.5 ± 0.2
9225	9192	<2.1	0.3 ± 0.1	0.8 ± 0.2
9242	9192	<1.8	0.2 ± 0.1	0.4 ± 0.3
9192	9208	<1.2	0.3 ± 0.1	0.5 ± 0.2
9208	9208	<1.2	0.2 ± 0.1	0.5 ± 0.3
9225	9208	<0.9	0.3 ± 0.1	0.6 ± 0.2
9242	9208	<0.8	0.4 ± 0.2	0.6 ± 0.1
9192	9225	<1.4	0.4 ± 0.1	0.5 ± 0.2
9208	9225	<1.2	0.2 ± 0.5	0.7 ± 0.3
9225	9225	0.6 ± 0.5	0.3 ± 0.1	1.8 ± 0.6

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<u>Coordinates</u>		<u>Concentrations (pCi/g +/- 1 sigma)</u>		
<u>East</u>	<u>North</u>	<u>Uranium-238</u>	<u>Radium-226</u>	<u>Thorium-232</u>
9242	9225	<0.8	0.3 ± 0.1	0.6 ± 0.2
9192	9142	<1.0	0.2 ± 0.1	0.4 ± 0.1
9208	9242	<1.4	0.4 ± 0.1	0.7 ± 0.1
9225	9242	<1.3	0.4 ± 0.2	0.7 ± 0.2
9242	9242	<1.2	0.3 ± 0.1	0.6 ± 0.1
9192	9258	2.3 ± 0.9	1.2 ± 0.1	9.3 ± 0.8
9208	9258	<1.2	0.3 ± 0.1	0.5 ± 0.1
9225	9258	2.1 ± 1.9	0.7 ± 0.1	7.8 ± 0.8
9242	9258	<1.2	0.3 ± 0.1	0.4 ± 0.3
9208	9275	<1.1	0.3 ± 0.1	0.5 ± 0.1
9225	9275	<1.0	0.2 ± 0.1	0.4 ± 0.1
9242	9275	<1.2	0.2 ± 0.1	0.4 ± 0.1
9225	9292	<1.8	0.7 ± 0.1	1.1 ± 0.2
9242	9292	1.6 ± 0.9	0.4 ± 0.1	1.4 ± 0.2
9342	9125	0.7 ± 0.9	0.6 ± 0.1	0.8 ± 0.1
9508	9158	2.3 ± 1.7	1.8 ± 0.2	3.6 ± 0.1
9525	9167	2.6 ± 1.9	1.5 ± 0.2	1.9 ± 0.7
9542	9167	3.7 ± 2.6	3.2 ± 0.4	3.6 ± 1.0
9558	9167	1.8 ± 0.2	2.1 ± 0.1	5.0 ± 0.9
9342	9175	<1.3	0.3 ± 0.1	0.6 ± 0.1
9558	9175	5.0 ± 3.1	2.2 ± 0.3	5.3 ± 1.4
9575	9175	1.3 ± 0.5	1.1 ± 0.4	2.9 ± 0.6
9475	9108	0.9 ± 0.7	0.5 ± 0.2	1.0 ± 0.1
9492	9108	<2.2	0.4 ± 0.2	0.8 ± 0.7
9475	9125	<2.8	0.4 ± 0.1	1.2 ± 0.1
9492	9125	<2.5	0.6 ± 0.1	1.0 ± 0.7
9475	9142	<4.0	1.0 ± 0.6	2.9 ± 0.3
9492	9142	<5.8	1.4 ± 1.3	7.3 ± 3.8
9475	9158	<3.0	0.7 ± 0.4	1.8 ± 0.4
9492	9158	4.1 ± 0.9	2.8 ± 0.2	9.2 ± 0.3
9092	9158	<2.6	0.6 ± 0.4	1.5 ± 0.3
9092	9175	<4.2	3.0 ± 1.1	14.7 ± 4.5
9108	9158	<5.1	1.7 ± 0.1	12.3 ± 0.7
9108	9175	<2.7	0.6 ± 0.4	1.5 ± 0.6
9125	9192	<3.7	1.1 ± 0.2	5.6 ± 1.9
9142	9175	<3.0	0.9 ± 0.1	3.6 ± 0.7
9142	9192	<1.7	0.7 ± 0.3	1.6 ± 0.2
9158	9158	<2.5	0.4 ± 0.1	1.1 ± 0.2
9175	9158	<1.9	0.5 ± 0.1	1.4 ± 0.1
9158	9192	4.6 ± 2.2	1.0 ± 0.5	10.6 ± 1.5
9175	9208	<1.5	0.5 ± 0.2	0.6 ± 0.2
9175	9225	<1.3	0.4 ± 0.1	0.4 ± 0.1
9175	9242	<1.2	0.4 ± 0.2	0.3 ± 0.1

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POST-REMEDIAL ACTION SAMPLING RESULTS
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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9192	9175	<1.5	0.5 ± 0.1	0.8 ± 0.3
9192	9192	<1.2	0.3 ± 0.1	0.4 ± 0.2
9092	9125	1.5 ± 1.0	0.5 ± 0.2	1.4 ± 0.3
9092	9142	<0.8	0.4 ± 0.2	0.7 ± 0.2
8975	9042	0.8 ± 0.1	0.6 ± 0.1	0.7 ± 0.1
8992	9042	<1.2	0.4 ± 0.2	0.4 ± 0.2
8992	9058	<0.8	0.3 ± 0.1	0.7 ± 0.4
9008	9075	<1.3	0.3 ± 0.1	0.3 ± 0.3
9025	9092	0.4 ± 0.7	0.3 ± 0.1	0.4 ± 0.2
9042	9108	<1.0	0.3 ± 0.1	0.4 ± 0.2
9042	9092	<2.3	0.4 ± 0.1	0.3 ± 0.3
9058	9108	<1.5	0.3 ± 0.2	0.6 ± 0.2
9058	9125	<2.0	0.3 ± 0.2	0.6 ± 0.2
9075	9108	<2.6	0.5 ± 0.1	1.3 ± 0.2
9075	9125	<2.5	0.6 ± 0.1	1.1 ± 0.3
9075	9142	<2.0	0.3 ± 0.1	0.3 ± 0.3
9075	9158	5.5 ± 1.1	1.9 ± 0.2	14.0 ± 0.9
9092	9108	<2.6	0.7 ± 0.2	2.8 ± 0.5
9142	9208	<2.2	0.6 ± 0.1	0.7 ± 0.3
9158	9208	<1.0	0.3 ± 0.1	0.3 ± 0.2
9158	9225	<2.7	0.4 ± 0.1	1.6 ± 0.6
9034	9125	<3.5	0.6 ± 0.1	2.6 ± 1.1
9034	9134	<2.3	0.4 ± 0.1	1.2 ± 0.3
9017	9117	<2.3	0.8 ± 0.2	2.2 ± 0.7
9008	9458	<2.9	0.7 ± 0.2	1.5 ± 0.2
9008	9475	<2.5	0.7 ± 0.1	0.8 ± 0.2
9008	9492	<2.3	0.5 ± 0.1	0.7 ± 0.4
9008	9508	<2.6	0.6 ± 0.1	1.7 ± 0.6
9025	9458	<2.4	0.6 ± 0.1	1.0 ± 0.1
9025	9475	<2.4	0.7 ± 0.3	2.0 ± 0.9
9025	9492	<3.1	0.5 ± 0.2	2.2 ± 0.6
9025	9508	<2.6	0.5 ± 0.2	0.9 ± 0.2
9042	9358	<2.7	0.3 ± 0.4	0.9 ± 0.3
9042	9375	<2.3	0.7 ± 0.2	0.7 ± 0.4
9042	9392	<2.6	0.3 ± 0.2	1.0 ± 0.3
9042	9508	<2.4	0.4 ± 0.1	0.7 ± 0.6
9058	9358	<2.5	0.4 ± 0.1	0.8 ± 0.1
9058	9375	<2.3	0.5 ± 0.3	1.4 ± 0.2
9058	9392	<2.2	0.4 ± 0.1	0.2 ± 0.1
9058	9508	<2.0	0.3 ± 0.2	0.5 ± 0.3
9075	9458	<2.3	0.8 ± 0.2	2.3 ± 0.8
9075	9475	<1.0	0.6 ± 0.1	0.8 ± 0.1
9075	9492	<1.0	0.4 ± 0.1	0.5 ± 0.3

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<u>Coordinates</u>		<u>Concentrations (pCi/g +/- 1 sigma)</u>		
<u>East</u>	<u>North</u>	<u>Uranium-238</u>	<u>Radium-226</u>	<u>Thorium-232</u>
9075	9508	<1.4	0.4 + 0.1	0.5 + 0.1
9092	9458	2.9 + 3.3	0.8 + 0.2	3.2 + 0.4
9092	9475	<0.9	0.4 + 0.1	1.2 + 0.8
9092	9492	<1.1	0.4 + 0.1	1.0 + 0.3
9092	9508	<0.9	0.4 + 0.1	0.5 + 0.2
9108	9458	1.0 + 0.6	0.4 + 0.3	0.9 + 0.3
9108	9475	0.7 + 0.7	0.4 + 0.2	0.7 + 0.2
9108	9492	<1.4	0.4 + 0.7	0.6 + 0.3
9108	9508	1.2 + 0.1	0.4 + 0.1	0.7 + 0.1
9125	9475	4.0 + 4.3	0.9 + 0.3	5.1 + 3.0
9125	9492	<0.8	0.3 + 0.1	0.5 + 0.2
9125	9508	1.9 + 1.6	0.7 + 0.1	2.7 + 1.0
9142	9492	<1.5	0.4 + 0.1	0.6 + 0.2
9142	9508	<1.2	0.2 + 0.1	0.4 + 0.1
9158	9492	0.8 + 0.7	0.3 + 0.1	0.6 + 0.3
9158	9508	1.4 + 1.0	0.4 + 0.2	1.3 + 0.3
9175	9492	<1.3	0.5 + 0.1	1.5 + 0.5
9175	9508	2.0 + 2.3	0.5 + 0.1	0.7 + 0.1
9192	9508	1.2 + 2.2	0.8 + 0.2	3.6 + 0.8
9135	9212	2.9 + 1.9	1.2 + 0.2	7.3 + 1.5
9153	9243	<1.5	0.6 + 0.1	1.7 + 0.7
9158	9238	<2.0	0.5 + 0.1	0.8 + 0.2
9175	9267	4.7 + 1.4	1.2 + 0.2	7.4 + 1.1
9180	9262	<1.4	0.4 + 0.1	0.7 + 0.5
9198	9293	<4.6	0.9 + 0.1	5.1 + 2.5
9203	9288	<4.8	1.3 + 0.2	5.8 + 3.6
9220	9315	<3.0	0.5 + 0.1	2.2 + 0.6
9225	9310	<1.4	0.3 + 0.1	0.3 + 0.2
9243	9340	<7.2	0.9 + 0.2	3.9 + 0.8
9248	9335	<1.9	0.9 + 0.1	1.9 + 0.4
9090	9165	<3.4	1.5 + 0.1	8.1 + 1.3
9115	9190	<6.0	1.4 + 0.7	7.7 + 4.4
9110	9195	<2.8	0.6 + 0.2	1.8 + 0.2
9130	9217	<1.6	1.0 + 0.3	5.1 + 3.2
8817	9475	<0.8	0.3 + 0.1	0.8 + 0.1
8817	9492	<1.1	0.3 + 0.1	0.5 + 0.1
8842	9475	<1.5	0.6 + 0.2	2.5 + 0.3
8892	9275	1.3 + 0.2	0.7 + 0.1	0.8 + 0.3
8892	9292	4.1 + 1.7	1.7 + 0.1	2.7 + 0.5
8892	9308	0.9 + 1.2	0.7 + 0.1	1.2 + 1.0
8892	9392	<1.5	0.5 + 0.1	0.8 + 0.2
8892	9408	<1.5	0.5 + 0.1	0.7 + 0.3
8908	9408	<0.9	0.3 + 0.1	0.6 + 0.2

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
8925	9292	0.6 ± 0.8	0.5 ± 0.2	0.6 ± 0.3
8925	9308	<0.9	0.5 ± 0.1	0.7 ± 0.2
8925	9325	<1.4	0.3 ± 0.1	0.6 ± 0.4
8925	9342	<2.0	0.3 ± 0.1	1.4 ± 0.2
8925	9408	<1.4	0.5 ± 0.1	1.3 ± 0.7
8925	9492	<2.3	0.4 ± 0.2	0.7 ± 0.3
8925	9508	<2.6	0.6 ± 0.2	0.7 ± 0.4
8942	9292	<2.3	0.5 ± 0.1	0.6 ± 0.4
8942	9308	<1.9	0.3 ± 0.1	<0.6
8942	9325	<2.5	0.6 ± 0.2	0.7 ± 0.3
8942	9342	<1.9	0.2 ± 0.2	0.7 ± 0.2
8942	9375	<3.3	0.6 ± 0.2	1.4 ± 0.9
8942	9392	<2.1	0.4 ± 0.2	0.6 ± 0.1
8942	9408	<2.5	0.7 ± 1.0	1.1 ± 0.4
8942	9425	<2.2	0.5 ± 0.1	0.3 ± 0.4
8942	9492	<2.5	0.4 ± 0.2	1.3 ± 0.1
8942	9508	<2.5	0.5 ± 0.4	0.7 ± 0.2
9085	9170	<6.2	1.3 ± 0.5	10.7 ± 1.9
9357	9147	<4.5	0.7 ± 0.1	6.0 ± 1.3
9062	9142	<3.9	0.5 ± 0.1	5.9 ± 2.1
9023	9093	2.0 ± 2.0	1.5 ± 0.2	9.6 ± 3.9
9018	9098	1.2 ± 1.1	0.6 ± 0.2	3.1 ± 0.7
9000	9071	<1.5	0.4 ± 0.1	1.2 ± 0.3
8995	9076	<1.4	0.6 ± 0.2	4.0 ± 0.4
8978	9045	<1.4	0.5 ± 0.1	1.4 ± 0.2
8973	9050	1.9 ± 1.6	1.0 ± 0.1	5.2 ± 1.1
8942	9092	<1.1	0.2 ± 0.2	0.4 ± 0.3
8942	9108	<2.0	0.8 ± 0.2	3.2 ± 0.8
8942	9125	1.6 ± 0.6	0.8 ± 0.2	3.3 ± 1.8
8942	9142	1.5 ± 1.7	1.0 ± 0.2	3.9 ± 2.1
8942	9192	<1.5	0.4 ± 0.2	0.6 ± 0.1
8942	9208	3.7 ± 2.1	1.4 ± 0.2	8.9 ± 0.8
8958	9058	2.7 ± 1.4	1.0 ± 0.4	5.0 ± 1.0
8958	9075	<0.9	0.4 ± 0.1	0.9 ± 0.1
8958	9092	<1.4	0.6 ± 0.1	2.6 ± 1.3
8958	9108	<2.7	0.5 ± 0.4	1.2 ± 0.2
8958	9125	<3.6	0.8 ± 0.3	2.5 ± 1.2
8958	9142	<2.6	0.6 ± 0.2	3.1 ± 1.2
8958	9158	<2.7	0.3 ± 0.3	1.2 ± 0.8
8958	9175	<1.9	0.2 ± 0.2	0.4 ± 0.3
8958	9192	<2.0	0.5 ± 0.1	0.4 ± 0.4
8975	9075	<1.9	0.2 ± 0.3	0.6 ± 0.3
8975	9142	<4.5	0.8 ± 0.3	4.4 ± 0.7

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<u>Coordinates</u>		<u>Concentrations (pCi/g +/- 1 sigma)</u>		
<u>East</u>	<u>North</u>	<u>Uranium-238</u>	<u>Radium-226</u>	<u>Thorium-232</u>
8975	9158	<4.0	1.0 + 0.1	4.0 + 0.4
8975	9175	<2.6	0.4 + 0.1	0.8 + 0.6
8975	9192	<2.3	0.5 + 0.1	0.6 + 0.4
8992	9092	<1.6	0.4 + 0.2	0.4 + 0.3
8992	9108	<2.4	0.4 + 0.1	0.4 + 0.4
8992	9125	<1.7	0.2 + 0.2	<0.4
8992	9142	<3.1	0.6 + 0.2	1.7 + 0.4
8992	9158	<3.9	1.6 + 0.3	8.0 + 1.4
8992	9175	<3.9	1.4 + 0.8	10.2 + 5.6
8992	9192	<2.0	0.4 + 0.2	0.5 + 0.2
9008	9108	<2.5	0.4 + 0.1	0.8 + 0.3
9008	9125	<2.5	0.6 + 0.3	0.5 + 0.1
9008	9142	<2.3	0.4 + 0.2	0.6 + 0.2
9008	9158	<3.3	0.6 + 0.3	1.5 + 0.4
9008	9175	<5.8	1.2 + 0.1	8.0 + 2.7
9008	9192	<2.4	0.5 + 0.1	0.6 + 0.1
9042	9075	<3.2	0.6 + 0.1	1.7 + 0.4
9042	9158	<2.7	0.6 + 0.4	0.7 + 0.4
9042	9175	<2.0	0.4 + 0.1	0.4 + 0.2
9042	9192	<2.3	0.4 + 0.2	0.7 + 0.1
9042	9275	<3.2	0.6 + 0.1	1.6 + 1.3
9042	9292	<4.5	0.9 + 0.3	4.8 + 2.0
9042	9325	0.6 + 1.4	0.8 + 0.1	4.3 + 1.7
9042	9342	0.8 + 0.8	0.6 + 0.1	0.7 + 0.4
9042	9358	<1.0	0.4 + 0.1	0.8 + 0.3
9058	9175	1.1 + 0.9	0.5 + 0.1	0.8 + 0.3
9058	9192	<1.5	0.4 + 0.1	1.0 + 0.4
9058	9208	<1.4	0.9 + 0.1	3.8 + 0.5
9058	9225	<1.5	0.5 + 0.1	0.6 + 0.2
9058	9242	<0.8	0.6 + 0.1	0.6 + 0.1
9058	9258	<0.7	0.5 + 0.1	1.2 + 0.6
9058	9292	2.4 + 0.2	1.0 + 0.1	5.7 + 3.7
9058	9225	<1.4	0.5 + 0.1	0.6 + 0.3
9058	9242	<1.4	0.6 + 0.2	0.7 + 0.2
9058	9275	1.0 + 0.9	0.5 + 0.2	1.6 + 0.4
9075	9192	1.0 + 0.8	0.4 + 0.2	1.0 + 0.3
9075	9208	0.8 + 0.7	0.4 + 0.1	0.8 + 0.4
9075	9225	2.7 + 1.8	1.2 + 0.2	6.2 + 0.8
9075	9325	<2.0	0.5 + 0.3	1.0 + 0.2
9075	9342	<1.5	0.5 + 0.1	0.8 + 0.5
9075	9358	<1.6	0.6 + 0.1	0.7 + 0.4
9075	9375	<13.3	0.5 + 0.2	0.9 + 0.1
9092	9208	0.1 + 0.5	0.5 + 0.1	0.7 + 0.1

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<u>Coordinates</u>		<u>Concentrations (pCi/g +/- 1 sigma)</u>		
<u>East</u>	<u>North</u>	<u>Uranium-238</u>	<u>Radium-226</u>	<u>Thorium-232</u>
9092	9225	<1.5	0.5 + 0.2	0.8 + 0.3
9092	9242	<0.9	0.4 + 0.2	1.2 + 0.5
9092	9292	<1.3	0.7 + 0.4	2.3 + 1.2
9092	9308	<0.9	0.5 + 0.1	1.1 + 0.9
9092	9325	<1.5	0.5 + 0.2	0.6 + 0.7
9108	9208	<1.0	0.5 + 0.1	0.9 + 0.4
9108	9225	<1.2	0.5 + 0.1	1.6 + 0.3
9108	9242	2.7 + 0.9	0.9 + 0.2	4.1 + 0.3
9108	9258	<0.9	0.3 + 0.1	0.7 + 0.2
9108	9275	<2.5	0.7 + 0.2	1.4 + 0.2
9108	9299	<6.4	1.6 + 0.3	9.3 + 3.9
9125	9225	<2.1	0.3 + 0.1	0.8 + 0.4
9125	9242	<3.1	0.6 + 0.1	1.7 + 0.4
9125	9258	<2.2	0.7 + 0.1	1.6 + 1.4
9125	9275	<2.0	0.4 + 0.2	0.6 + 0.2
9142	9242	<2.7	0.5 + 0.2	1.3 + 0.7
9142	9258	<1.9	0.4 + 0.1	0.5 + 0.1
9142	9275	<2.3	0.4 + 0.3	0.8 + 0.1
9158	9275	<2.6	0.3 + 0.4	1.0 + 0.3
9158	9292	<1.4	0.5 + 0.2	3.1 + 1.6
9175	9275	<1.9	0.6 + 0.1	1.8 + 0.6
9175	9292	<1.3	0.3 + 0.1	0.5 + 0.1
9175	9308	<1.1	0.6 + 0.2	3.1 + 1.0
9192	9292	3.9 + 2.7	1.6 + 0.3	8.4 + 5.1
9192	9308	5.0 + 1.8	0.8 + 0.1	4.1 + 0.6
9192	9325	<0.9	0.4 + 0.1	1.2 + 0.5
9208	9308	<1.1	0.4 + 0.1	1.0 + 0.4
9225	9325	<1.4	0.6 + 0.1	2.3 + 0.5
9208	9325	<1.1	0.5 + 0.2	0.7 + 0.1
9508	9008	2.2 + 1.2	0.5 + 0.1	1.6 + 0.4
9508	9025	<0.9	0.5 + 0.1	0.9 + 0.1
9508	9042	<1.5	0.4 + 0.2	0.6 + 0.2
9508	9058	<1.4	0.5 + 0.2	0.8 + 0.4
9508	9075	<1.2	0.5 + 0.2	1.6 + 0.2
9525	9008	<2.8	0.6 + 0.1	0.9 + 0.4
9525	9025	<2.2	0.5 + 0.2	0.6 + 0.1
9525	9042	<2.3	0.4 + 0.3	1.0 + 0.1
9525	9058	<2.3	0.4 + 0.1	0.8 + 0.1
9542	9008	<2.2	0.3 + 0.1	0.8 + 0.1
9542	9025	<2.5	0.4 + 0.2	1.0 + 0.4
9542	9042	<2.2	0.5 + 0.3	0.8 + 0.1
9558	9008	<2.3	0.5 + 0.2	0.3 + 0.3
9558	9025	<2.4	0.4 + 0.1	1.1 + 0.4

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9075	9008	<2.3	0.4 ± 0.1	0.6 ± 0.3
8958	9292	<2.2	0.3 ± 0.2	0.6 ± 0.4
8958	9308	<2.3	0.4 ± 0.2	0.6 ± 0.3
8958	9325	<2.3	0.5 ± 0.2	0.6 ± 0.3
8958	9342	<2.3	0.4 ± 0.1	0.5 ± 0.2
8958	9358	<4.4	1.1 ± 0.4	11.2 ± 4.0
8958	9375	<2.7	0.7 ± 0.1	0.8 ± 0.5
8958	9392	<2.7	0.4 ± 0.2	1.1 ± 0.3
8975	9308	<2.1	0.5 ± 0.1	1.1 ± 0.4
8975	9325	<2.3	0.6 ± 0.2	<0.7
8975	9342	<2.1	0.4 ± 0.1	0.7 ± 0.2
8975	9358	<2.5	0.5 ± 0.1	0.9 ± 0.4
8975	9375	<2.9	0.5 ± 0.4	1.3 ± 0.4
8975	9392	<3.7	0.8 ± 0.2	1.4 ± 1.0
8992	9325	<2.5	0.6 ± 0.1	0.9 ± 0.1
8992	9342	<2.3	0.5 ± 0.2	0.9 ± 0.1
8992	9358	<2.5	0.4 ± 0.4	0.8 ± 0.1
8992	9375	<3.3	0.5 ± 0.3	1.7 ± 0.1
8992	9392	<2.2	0.4 ± 0.1	0.6 ± 0.1
9008	9325	<2.8	0.7 ± 0.6	1.1 ± 0.4
9008	9342	<2.5	0.5 ± 0.1	0.8 ± 0.6
9008	9358	1.1 ± 0.9	0.4 ± 0.1	1.0 ± 0.1
9008	9375	<1.0	0.5 ± 0.1	1.0 ± 0.2
9008	9392	<1.1	0.6 ± 0.2	1.6 ± 0.4
9025	9158	0.8 ± 0.7	0.4 ± 0.1	0.7 ± 0.1
9025	9175	<1.0	0.4 ± 0.1	0.8 ± 0.2
9025	9192	1.0 ± 1.2	0.7 ± 0.1	2.1 ± 0.9
9025	9225	<1.4	0.4 ± 0.1	0.8 ± 0.2
9025	9242	<0.8	0.4 ± 0.1	0.5 ± 0.2
9025	9258	<1.1	0.4 ± 0.1	0.6 ± 0.1
9025	9275	<1.4	0.5 ± 0.1	0.7 ± 0.2
9025	9292	<1.1	0.5 ± 0.1	1.0 ± 0.1
9025	9308	<0.8	0.5 ± 0.1	0.7 ± 0.2
9025	9325	<0.8	0.5 ± 0.1	0.9 ± 0.1
9025	9342	<1.7	0.6 ± 0.1	0.9 ± 0.3
9025	9358	<1.6	0.5 ± 0.1	0.8 ± 0.2
9025	9375	0.8 ± 0.8	0.4 ± 0.1	0.7 ± 0.6
9025	9392	<1.8	0.5 ± 0.2	0.8 ± 0.8
9042	9375	<1.3	0.5 ± 0.1	1.0 ± 0.3
9225	9375	<1.0	0.6 ± 0.1	1.4 ± 0.3
9208	9375	2.0 ± 1.2	0.7 ± 0.1	2.2 ± 0.5
9208	9375	<0.8	0.6 ± 0.1	1.7 ± 0.5
9208	9392	1.4 ± 1.2	0.7 ± 0.1	2.2 ± 1.1

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9192	9358	<1.5	0.6 ± 0.2	2.0 ± 0.6
9192	9375	<1.8	0.6 ± 0.2	1.8 ± 0.6
9192	9392	<1.9	0.6 ± 0.2	1.3 ± 0.9
9192	9408	<1.6	0.8 ± 0.2	1.9 ± 0.2
9175	9342	1.1 ± 1.1	0.6 ± 0.1	1.2 ± 0.7
9175	9358	<1.2	0.6 ± 0.1	1.1 ± 0.5
9175	9375	1.4 ± 1.1	0.5 ± 0.1	0.7 ± 0.4
9175	9392	<1.0	0.4 ± 0.2	0.6 ± 0.2
9175	9408	<9.6	1.3 ± 0.4	2.5 ± 0.6
9175	9425	<3.1	0.6 ± 0.1	1.7 ± 0.8
9158	9325	<2.2	0.3 ± 0.1	0.9 ± 0.1
9158	9342	<2.8	0.4 ± 0.1	1.0 ± 0.7
9158	9358	<3.2	0.5 ± 0.3	1.9 ± 1.2
9158	9375	<3.6	1.1 ± 0.4	1.2 ± 0.2
9158	9392	<2.9	0.5 ± 0.4	1.1 ± 0.9
9158	9408	<2.7	0.3 ± 0.1	1.2 ± 0.5
9158	9425	<2.9	0.4 ± 0.4	1.2 ± 0.6
9142	9308	<3.0	0.7 ± 0.4	1.9 ± 0.9
9142	9325	<2.7	0.6 ± 0.1	1.3 ± 0.7
9142	9408	<3.3	0.6 ± 0.1	1.2 ± 1.3
9142	9425	<2.6	<0.4	0.6 ± 0.3
9142	9342	<2.5	0.4 ± 0.1	0.6 ± 0.1
9142	9358	<2.9	<0.4	1.5 ± 0.4
9142	9375	<2.7	1.0 ± 0.1	1.2 ± 0.6
9142	9392	<3.5	0.6 ± 0.1	2.0 ± 0.5
9125	9292	<2.5	0.6 ± 0.1	0.8 ± 0.2
9125	9308	<1.9	0.4 ± 0.1	0.4 ± 0.1
9125	9325	<2.5	0.6 ± 0.2	1.1 ± 0.3
9125	9342	<5.3	0.8 ± 0.1	4.2 ± 2.6
9125	9392	<4.6	0.9 ± 0.4	4.0 ± 2.6
9125	9408	<6.9	1.5 ± 0.7	12.1 ± 4.3
9125	9425	<2.8	0.3 ± 0.1	1.0 ± 0.2
9125	9442	<2.1	0.4 ± 0.1	0.3 ± 0.3
9125	9358	<2.3	0.5 ± 0.2	0.3 ± 0.2
9125	9375	<2.8	0.5 ± 0.2	1.4 ± 0.4
9108	9342	<8.6	1.1 ± 0.4	<2.5
9108	9358	<2.4	0.5 ± 0.1	0.8 ± 0.3
9108	9375	<2.7	0.7 ± 0.4	1.0 ± 0.2
9108	9392	<2.3	0.9 ± 0.1	5.8 ± 1.2
9108	9408	1.6 ± 1.3	1.0 ± 0.3	1.6 ± 0.5
9108	9425	1.0 ± 1.0	0.4 ± 0.1	0.8 ± 0.2
9092	9408	2.1 ± 1.0	0.4 ± 0.1	0.4 ± 0.1
9092	9425	0.9 ± 0.7	0.5 ± 0.1	0.8 ± 0.2

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9075	9408	0.6 ± 0.7	0.5 ± 0.1	1.1 ± 0.2
9075	9425	<1.4	0.5 ± 0.2	0.9 ± 0.5
9075	9442	<0.9	0.6 ± 0.1	0.9 ± 0.2
9058	9308	<1.6	0.5 ± 0.1	1.1 ± 0.2
9058	9325	<1.2	0.6 ± 0.1	1.7 ± 0.5
9058	9342	1.0 ± 0.8	0.5 ± 0.3	0.8 ± 0.1
9042	9392	1.2 ± 1.3	0.5 ± 0.2	2.0 ± 0.5
9042	9308	<1.0	0.6 ± 0.1	1.3 ± 0.2
9042	9325	<1.1	0.7 ± 0.1	1.9 ± 0.3
9042	9342	<1.3	0.5 ± 0.2	1.0 ± 0.3
9025	9208	<2.5	0.7 ± 0.2	0.8 ± 0.1
9025	9408	<2.6	0.5 ± 0.1	1.1 ± 0.5
9025	9425	<2.8	0.4 ± 0.1	1.1 ± 0.4
9025	9442	<2.1	0.7 ± 0.1	2.4 ± 0.5
9008	9408	<1.6	0.6 ± 0.2	1.5 ± 0.7
9008	9425	<2.4	0.8 ± 0.2	2.7 ± 0.5
9008	9442	<2.7	0.8 ± 0.3	4.1 ± 0.7
8992	9408	<1.9	0.5 ± 0.1	2.2 ± 0.9
8992	9425	<3.3	0.5 ± 0.2	1.9 ± 0.5
8992	9442	<3.6	0.5 ± 0.3	2.0 ± 0.9
8992	9458	<3.1	0.5 ± 0.3	1.4 ± 0.4
8992	9475	<2.7	0.5 ± 0.2	1.6 ± 0.1
8992	9492	<0.9	0.5 ± 0.1	1.5 ± 0.3
8975	9108	<2.8	1.4 ± 0.4	7.2 ± 3.8
8975	9092	3.6 ± 1.4	1.0 ± 0.1	6.1 ± 1.4
8975	9142	<1.6	0.3 ± 0.1	0.9 ± 0.2
8975	9408	<1.6	0.7 ± 0.2	3.5 ± 0.6
8992	9508	<1.9	0.7 ± 0.2	2.9 ± 2.9
8975	9425	<1.1	0.4 ± 0.4	1.2 ± 0.1
8975	9442	1.9 ± 1.3	0.6 ± 0.1	2.2 ± 0.4
8975	9458	<2.0	0.4 ± 0.1	1.2 ± 0.3
8975	9475	<1.4	0.6 ± 0.1	1.8 ± 0.5
8975	9492	1.3 ± 1.3	0.5 ± 0.1	1.6 ± 0.3
8975	9508	1.7 ± 1.5	0.7 ± 0.2	2.4 ± 1.3
8958	9408	<1.1	0.6 ± 0.1	1.2 ± 0.6
8958	9425	<1.8	0.5 ± 0.1	1.1 ± 0.4
8958	9442	0.6 ± 1.3	0.6 ± 0.3	1.2 ± 0.4
8958	9458	<0.9	0.5 ± 0.1	1.1 ± 0.7
8958	9475	<2.2	0.6 ± 0.1	3.7 ± 0.8
8958	9492	<1.0	0.7 ± 0.2	1.2 ± 0.9
8958	9508	<2.6	0.7 ± 0.2	0.9 ± 0.4
8942	9475	<2.5	0.5 ± 0.1	1.1 ± 0.7
8942	9458	<2.3	0.6 ± 0.1	2.4 ± 0.6

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Coordinates		Concentrations (pCi/g +/- 1 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
9042	9208	<1.9	0.3 ± 0.1	0.4 ± 0.2
9042	9225	<2.3	0.7 ± 0.4	1.9 ± 0.8
9042	9258	0.9 ± 1.2	0.6 ± 0.1	1.7 ± 0.4
9075	9242	1.8 ± 1.5	0.7 ± 0.1	4.3 ± 2.1
8975	9125	0.8 ± 0.9	0.3 ± 0.2	1.3 ± 0.5
9058	9258	0.9 ± 1.1	0.5 ± 0.1	1.0 ± 0.4
9045	9015	0.6 ± 0.2	0.4 ± 0.1	0.8 ± 0.1
9045	9030	<5.0	0.5 ± 0.1	0.7 ± 0.1
9055	9015	0.4 ± 0.2	0.3 ± 0.1	0.3 ± 0.1
9055	9030	0.6 ± 0.2	0.6 ± 0.1	1.1 ± 0.1
9070	9015	<5.0	0.5 ± 0.1	0.8 ± 0.1
9070	9030	1.0 ± 0.3	0.7 ± 0.1	2.1 ± 0.1
9085	9015	0.6 ± 0.3	0.7 ± 0.1	0.9 ± 0.1
9088	9030	0.9 ± 0.2	0.6 ± 0.1	1.3 ± 0.1
9100	9005	<5.0	1.0 ± 0.1	0.9 ± 0.2
9100	9015	<2.0	0.9 ± 0.1	1.3 ± 0.2
9100	9030	<5.0	0.7 ± 0.1	2.1 ± 0.3
9115	9005	<5.0	1.0 ± 0.1	3.4 ± 0.3
9115	9015	2.8 ± 0.4	1.2 ± 0.8	1.2 ± 0.1
9115	9030	<1.8	0.5 ± 0.1	1.3 ± 0.2
9130	9005	<5.0	0.7 ± 0.1	1.9 ± 0.4
9130	9015	4.5 ± 0.4	1.1 ± 0.5	2.6 ± 0.1
9130	9030	<5.0	0.8 ± 0.4	1.8 ± 0.3
9145	9005	<5.0	0.8 ± 0.1	1.5 ± 0.2
9145	9015	1.4 ± 0.4	0.9 ± 0.7	1.4 ± 0.1
9145	9030	<6.1	0.5 ± 0.1	0.7 ± 0.6
9160	9015	2.6 ± 0.4	1.0 ± 0.1	2.0 ± 0.4
9160	9030	<5.0	0.7 ± 0.1	0.9 ± 0.1
9175	9015	0.4 ± 0.1	0.5 ± 0.1	0.9 ± 0.1
9175	9030	0.7 ± 0.3	0.6 ± 0.1	0.8 ± 0.2
9190	9015	1.1 ± 0.2	0.6 ± 0.1	0.3 ± 0.1
9190	9030	<5.0	0.6 ± 0.1	0.8 ± 0.2
9205	9015	2.3 ± 0.5	0.7 ± 0.1	1.0 ± 0.1
9205	9030	<5.0	0.5 ± 0.1	0.7 ± 0.1
9230	9015	<5.0	0.7 ± 0.2	1.4 ± 0.3
9230	9030	<1.9	0.6 ± 0.8	1.4 ± 0.2
9245	9015	<1.7	0.6 ± 1.0	0.7 ± 0.1
9260	9000	<1.6	0.4 ± 0.6	0.8 ± 0.1
9260	9015	<5.0	0.8 ± 0.2	1.8 ± 0.4
9260	9030	<1.7	0.6 ± 0.7	0.9 ± 0.1
9275	9000	<2.0	0.6 ± 0.1	0.6 ± 0.3
9285	9000	<1.5	0.4 ± 0.1	0.5 ± 0.1
9300	9000	<5.0	0.7 ± 0.2	1.0 ± 0.3

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<u>Coordinates</u>		<u>Concentrations (pCi/g +/- 1 sigma)</u>		
<u>East</u>	<u>North</u>	<u>Uranium-238</u>	<u>Radium-226</u>	<u>Thorium-232</u>
9315	9000	<2.1	0.7 ± 0.1	1.4 ± 0.2

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5. U.S. Code of Federal Regulations. 40 CFR 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," Washington, DC, July 1984.
6. Department of Energy. Remedial Action Work Plan for the Maywood Site, ORO-850, Oak Ridge, TN, April 1985.

GLOSSARY

Alpha radiation - See radiation.

Background radiation - Background radiation refers to naturally occurring radiation emitted from either cosmic (e.g., from the sun) or terrestrial (e.g., from the earth) sources. Exposure to this type of radiation is unavoidable and its level varies greatly depending on geographic location, e.g., New Jersey typically receives 100 mrem/yr, Colorado receives about 300 mrem/yr, and some areas in South America receive up to 7000 mrem/yr. Naturally occurring terrestrial radionuclides include uranium, radium, potassium, thorium, etc.

Beta radiation - See radiation.

Contamination - Contamination means a concentration of radioactive materials in the soil exceeding that permitted by DOE guidelines.

Counts per minute - A count is the unit of measurement registered by a radiation detection instrument when radiation imparts its energy within the sensitive range of the detector probe. The number of counts registered per minute can be related to the number of disintegrations per minute occurring from a radioactive material.

Disintegrations per minute - Disintegrations per minute is the measurement indicating the amount of radiation being released from a substance per minute. See the definition of picocurie for more information.

Dose - Dose is used to relate radiation exposure to an effect on the body. Dose is measured in mrem. Examples of dose are: a dose of 500,000 mrem to the whole body in a short time causes death in 50 percent of the people who receive it; a dose of 5,000,000 mrem may be delivered to a cancerous tumor during radiation treatment; normal background radiation results in an annual dose of about 100 mrem; DOE radiation protection standards limit the dose to members of the

general public to 100 mrem/yr above background levels; a typical chest x-ray gives a dose of about 40 mrem; living in a brick house results in a dose of about 75 mrem/yr.

Exposure rate - Exposure rate is the rate at which radiation imparts energy to the air. Exposure is typically measured in uR and the exposure rate is typically given as uR/h. The dose to the whole body can be approximated by multiplying the exposure rate by the number of hours of exposure. For example, if an individual were exposed to gamma radiation at a rate of 20 uR/h for 168 hours per week (continuous exposure) for 52 weeks per year, the whole-body dose would be 170 mrem.

Gamma radiation - See radiation.

Gram - A gram is a metric unit for weight. It takes 454 grams to make 1 pound; 1 ounce equals 28 grams.

Leaching - Leaching is a chemical process whereby the radionuclides from the ore residues were dissolved in water (runoff following precipitation) and seeped into the surrounding soil. Storage piles of radioactive materials are usually covered with waterproof materials to prevent leaching.

Meter - A meter is a metric unit of measurement for length; 1 meter is equal to approximately 39 inches.

Microcurie - A microcurie is 1,000,000 picocuries (see picocuries for additional explanation).

Microroentgens - Microroentgens (uR) is a unit used to measure radiation exposure. For further information, see the definition of radiation exposure.

Milliliter - A milliliter is a unit of measure for volume. There are 3785 ml in 1 gallon.

Millirad - Millirad is a measure of the amount of energy imparted by radiation to a unit of mass. It is generally expressed in terms of a rate per hour, i.e., mrad/h.

Millirem - Millirem is the unit used to measure radiation doses to man. The DOE limit is 100 mrem above background radiation levels for members of the general public in any one year. For comparison, a typical chest x-ray is about 40 mrem. Naturally occurring radioactive substances in the ground result in a yearly exposure to everyone of about 100 mrem. To date, no difference can be detected in the health of population groups exposed to 100 mrem/yr above background and in the health of groups who are not exposed.

Monazite - Monazite is a mineral which contains unusually high concentrations of thorium and rare earth metals. Monazite is often found in sand and gravel deposits.

Picocuries - A picocurie is the unit of measure for radioactivity just as an ounce is a unit to measure weight. One picocurie means that one radioactive particle is released on the average of every 27 seconds.

Radiation - There are three primary types of radiation: alpha, beta, and gamma. Alpha radiation travels less than an inch in air before it stops. Alpha radiation cannot penetrate the outer layer of skin on the body. Beta radiation can penetrate the outer layers of skin, but cannot reach the internal organs of the body. Gamma radiation is the most penetrating type and can usually reach the internal organs. For radioactive material external to the body, gamma radiation is the principal concern. For radioactive material that enters the body by ingestion or inhalation, alpha and beta radiation are also of concern.

Radionuclide - A radionuclide is another word meaning a particular radioactive element. For example, radium-226 is a radionuclide, uranium-238 is another, thorium-232 another, and so on.

Rare earths - Rare earths refers to various types of metals present in the monazite sands. These were extracted from the monazite for their value. Rare earth metals include cerium, lanthanum, praseodymium, and neodymium.

Remedial action - Remedial action is a general term typically used to mean "cleanup of contamination." With reference to cleanup of the Ballod property, it means any action required to bring the property to a condition which will permit its release for unrestricted use. In practice, this may mean removing grass and soil, cutting trees, removing asphalt, etc.

Thorium - Thorium is a naturally occurring element which is recovered from monazite for commercial purposes. Monazite contains from 3 to 9 percent thorium oxide. The principal use of thorium to date has been in the preparation of gas lantern mantels because thorium oxide burns with a brilliant white light. Thorium oxide is also commonly found in high quality glasses and camera lenses because of its good optical characteristics.

Unrestricted Use - Unrestricted use means that the property can be used for any purpose without regard to the radioactivity which used to be on the property. These uses could include anything - farming, a residence, a playground, etc.

Uranium - Uranium is a naturally occurring, radioactive element. The principal use of uranium -- when refined -- is for the production of fuel for nuclear reactors. Uranium in its natural form (as it exists on the Ballod property) is not suitable for use as a fuel source.

Working level - Working level is a unit to measure the energy expended in air by radon or its radioactive decay products. The term was derived for use with uranium mine workers and has become the accepted unit for environmental measurements.