

041493-01

77-113

Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for Maywood, New Jersey



U.S. Department of Energy

041483

Bechtel National, Inc.

Engineers - Constructors

Jackson Plaza Tower
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830



Mail Address: P.O. Box 350, Oak Ridge, TN 37831-0350
Telex: 3785873
NOV 19 1986

U.S. Department of Energy
Oak Ridge Operations
Post Office Box E
Oak Ridge, Tennessee 37831

Attention: R. G. Atkin, Site Manager
Technical Services Division

Subject: Bechtel Job No. 14501, FUSRAP Project
DOE Contract No. DE-AC05-81OR20722
Radiological Characterization Report for the
New York Susquehanna & Western Railroad Property
In the Vicinity of the Maywood Interim Storage Site
Code: 7310/File: 138

Dear Mr. Atkin:

In August and September 1986, Bechtel National, Inc. (BNI) performed a radiological characterization survey of the New York, Susquehanna, and Western (NYS&W) Railroad property in Maywood and Rochelle Park, New Jersey. The objective of this survey was to establish the horizontal and vertical limits of contamination on the property. This letter describes the methods used to characterize the property and presents the findings of the survey.

SITE DESCRIPTION AND BACKGROUND

The NYS&W property borders the entire length of the Maywood Interim Storage Site (MISS) on the north. The property consists of two sets of railroad tracks, an unused spur, and an easement on both sides of the tracks. The railroad has been granted a 150-ft right-of-way, but the right-of-way is not keyed to a specific benchmark. Consequently, the boundaries of the railroad property vary, i.e., the size of the easements on either side of the tracks are not equal. For this characterization, the area over the tracks and extending down the embankment to the fences that run parallel to the railroad tracks was characterized.

Contamination on the property resulted from operations conducted by the Maywood Chemical Works to extract thorium from monazite sands. The primary contaminant in the residue was thorium-232, and it was buried or otherwise deposited at various locations around the MISS. Previous investigations by the New Jersey Department of

CONCURRENCE

Jmd	CSB	WAh		
-----	-----	-----	--	--

Environmental Protection, the Nuclear Regulatory Commission, H.W. Morton (a consultant to the Stepan Company), the Environmental Protection Agency, and BNI have detected elevated concentrations of thorium-232, radium-226, and radium-228 along the northern boundary of the MISS and the southern boundary of the NYS&W property.

RADIOLOGICAL CHARACTERIZATION

To provide sufficiently detailed information regarding the areal limits of radioactive contamination and to ensure the development of cost-effective remedial action measures, both surface and subsurface investigations were performed.

A 50-ft grid was established across the site to facilitate the collection of data in a systematic manner. This grid was tied to the New Jersey state grid system to ensure that it could be reestablished when remedial action begins. All characterization data are tied to coordinates on this grid.

Surface Characterization

Surface characterization was conducted by using a shielded gamma scintillation detector. Near-surface gamma radiation measurements were taken 12 in. from the ground at the intersections of mutually perpendicular grid lines spaced 10 ft apart. Use of the shielded detector ensures that any radiation detected by the probe is originating from the ground directly beneath the unit. By shielding against lateral gamma flux from nearby areas of contamination, the shielded detector minimizes possible sources of error in the measurements. Furthermore, this detector was calibrated at the Technical Measurements Center (TMC) in Grand Junction, Colorado, to provide a direct correlation of counts per minute (cpm) to picocuries per gram (pCi/g). This calibration showed that 11,000 cpm corresponds to the DOE guideline of 5 pCi/g for surface contamination.

Gamma levels measured on the property ranged from the background level of 5,000 cpm to 918,000 cpm, or approximately 1.5 pCi/g to 379 pCi/g. To identify surface areas where the level of contamination exceeds the DOE guideline for thorium-232, areas where readings exceeded 11,000 cpm were plotted on a grid. Plotting these areas showed that an area equal to approximately 118,425 ft² is contaminated. Figure 1 shows the areas of the surface contamination. In addition, near-surface gamma measurements showed that contamination extended onto two residential properties north of the railroad property. These properties (130 and 136 West Central) had been identified during the 1985 ad hoc survey program. Oak Ridge National Laboratory will conduct radiological characterizations of these properties for designation purposes.

Subsurface Investigation

After the surface characterization was completed, a subsurface investigation was conducted to determine the depth of the previously identified surface contamination, and to locate subsurface contamination where there is no surface manifestation. The subsurface investigation was conducted using downhole gamma logging. This technique is significantly more cost effective than soil sampling, because the procedure can be completed more quickly and eliminates the need for laboratory analysis.

The instrument used to perform downhole logging (a 2-in. by 2-in. sodium iodide gamma scintillometer) was calibrated at TMC, where it was determined that a count rate of approximately 40,000 cpm corresponds to the 15 pCi/g concentration limit for thorium-232. This relationship has been supported in the results of previous characterizations where thorium was found.

During the course of the subsurface investigation, 41 radiological boreholes were drilled and gamma logged to determine the depths and concentrations of radioactive contamination. The borehole logs were reviewed to identify trends, regardless of whether concentrations exceeded the DOE guideline. Borehole locations are shown in Figure 2. Detailed gamma logging data are presented in Table 1.

As shown in the Table 1 data, subsurface contamination was found under the southern most railroad spur, i.e., the one nearest to the site boundary. These data support the conclusion reached during a review of existing information that indicated subsurface contamination on the railroad property. Old photographs showed the spur was built over a previously low-lying area that had been filled in with contaminated material from the Maywood Chemical Works.

SUMMARY

The results of the characterization of the NYS&W property are summarized below.

- o A surface area equal to approximately 118,425 ft² is contaminated above the DOE guideline of 5 pCi/g.
- o An estimated 9600 yd³ of contaminated material will require excavation. The contamination ranges from surface deposition to a depth of 13 ft in the area along the railroad spur.
- o Contamination extends onto two residential properties north of the railroad property (130 and 136 West Central).

Mr. R. G. Atkin

4

If additional information concerning this characterization is required, please contact Chris Leichtweis at 576-2366.

Very truly yours,



James R. Kannard
Project Manager - FUSRAP

CPL:jm

Attachments: As stated

cc: S. W. Ahrends
J. F. Nemec

Received by

NOV 19 1980

FUS-10-0000

3364A

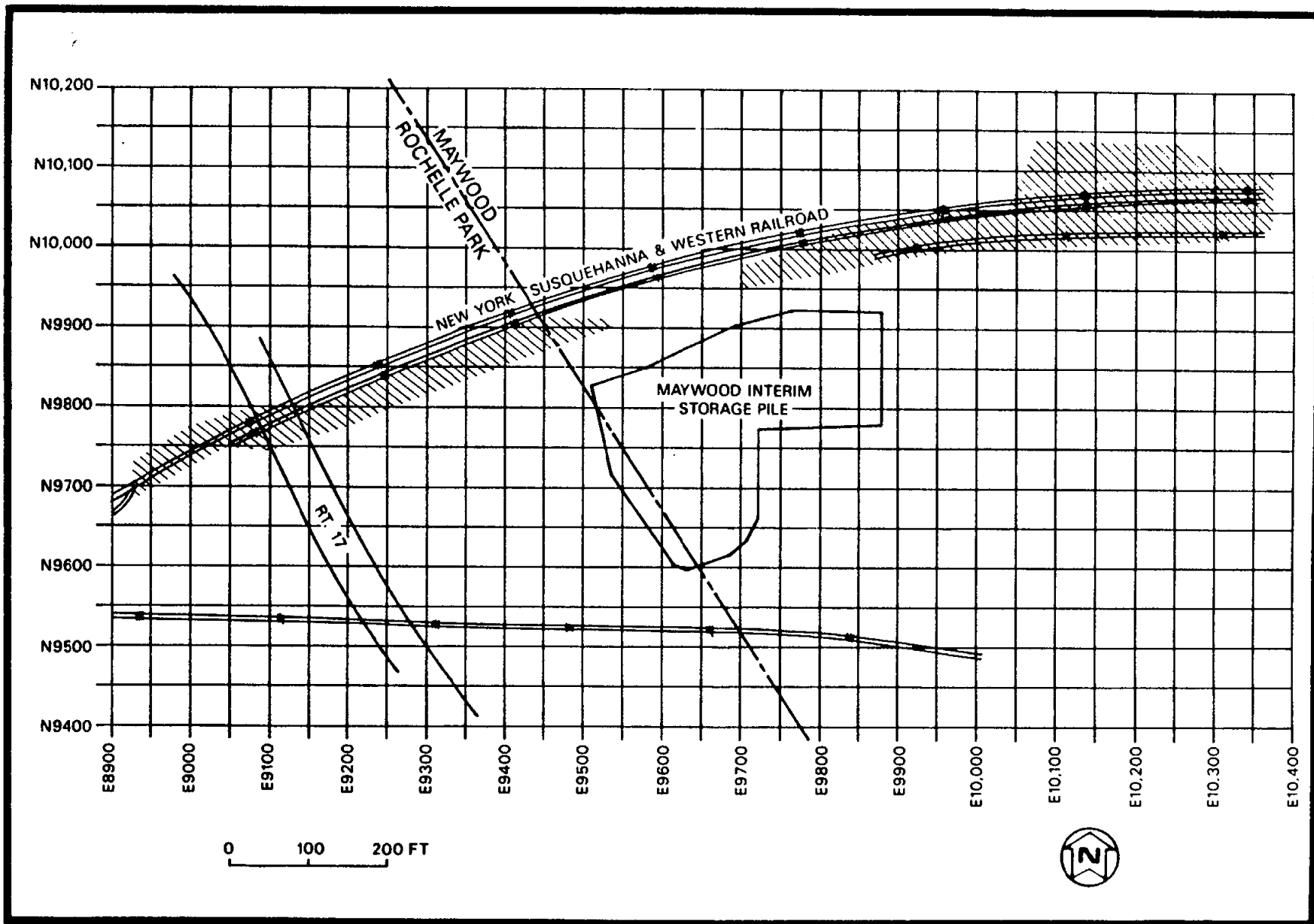


FIGURE 1 BOUNDARIES OF SURFACE CONTAMINATION ON THE NYS&W RAILROAD PROPERTY IN THE VICINITY OF THE MISS

041493

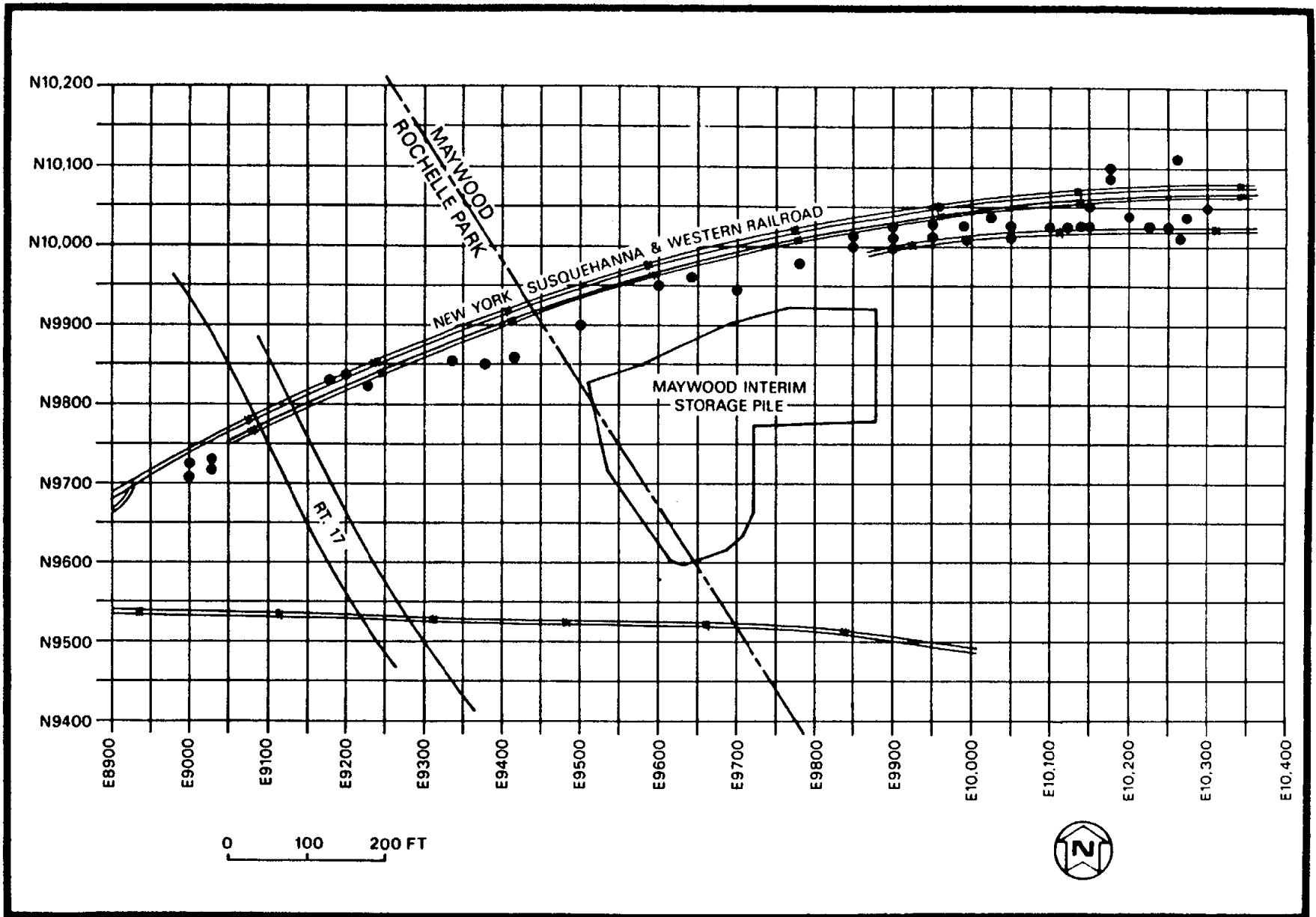


FIGURE 2 BOREHOLE LOCATIONS ON THE NYS&W RAILROAD PROPERTY IN THE VICINITY OF THE MISS

041603

TABLE 1
Downhole Logging^{a,b}

Page 1 of 7

Depth (ft)	Coordinates					
	R09000 N09708	R09000 N09725	R09025 N09720	R09025 N09730	R09175 N09832	R09200 N09837
0.5	168,206	36,145	102,171	102,113	15,626	15,464
1.0	143,176	12,117	99,136	81,171	16,217	15,301
1.5	137,206	10,179	87,147	46,175	16,394	17,596
2.0	90,127	9,317	66,146	25,125	18,182	-
2.5	72,172	10,111	36,125	13,136	19,345	-
3.0	38,431 ^c	12,196	30,114	12,117	-	-
3.5	-	-	-	-	-	-
4.0	-	-	-	-	-	-
4.5	-	-	-	-	-	-
5.0	-	-	-	-	-	-
5.5	-	-	-	-	-	-
6.0	-	-	-	-	-	-
6.5	-	-	-	-	-	-
7.0	-	-	-	-	-	-
7.5	-	-	-	-	-	-
8.0	-	-	-	-	-	-
8.5	-	-	-	-	-	-
9.0	-	-	-	-	-	-
9.5	-	-	-	-	-	-
10.0	-	-	-	-	-	-
10.5	-	-	-	-	-	-
11.0	-	-	-	-	-	-
11.5	-	-	-	-	-	-
12.0	-	-	-	-	-	-
12.5	-	-	-	-	-	-
13.0	-	-	-	-	-	-
13.5	-	-	-	-	-	-
14.0	-	-	-	-	-	-
14.5	-	-	-	-	-	-
15.0	-	-	-	-	-	-

TABLE 1 (continued)

Page 2 of 7

Depth (ft)	Coordinates					
	K09225 N09825	K09335 N09855	K09375 N09850	K09415 N09860	K09500 N09900	K09600 N09950
0.5	292,600	12,000	17,658	39,310	16,018	8,740
1.0	312,810	20,720	15,346	39,655	11,982	4,872
1.5	146,700	40,200	14,058	28,200	8,410	3,560
2.0	66,520	20,060	13,922	20,140	6,160	2,490
2.5	40,001	20,080	13,304	15,000	4,216	2,072
3.0	29,990	38,160	13,575	13,605	3,404	2,334
3.5	14,899	67,640	12,998	10,120	3,492	2,492
4.0	14,286	86,840	12,122	10,842	5,850	2,782
4.5	13,166	40,488	12,220	10,500	8,728	3,892
5.0	11,866	11,276	12,037	10,666	12,062	7,604
5.5	12,397	11,862	-	10,500	10,040	15,084
6.0	13,216	11,578	-	9,600	8,904	20,078
6.5	12,527	10,684	-	9,200	8,448	17,008
7.0	13,730	11,344	-	9,150	6,666	12,306
7.5	12,766	11,256	-	9,110	7,648	10,710
8.0	-	11,344	-	9,900	7,540	10,548
8.5	-	11,088	-	9,920	7,184	10,146
9.0	-	11,406	-	8,884	6,672	11,004
9.5	-	11,212	-	-	7,034	11,052
10.0	-	-	-	-	7,800	11,372
10.5	-	-	-	-	8,400	10,152
11.0	-	-	-	-	8,500	9,562
11.5	-	-	-	-	7,120	9,320
12.0	-	-	-	-	7,400	9,252
12.5	-	-	-	-	7,080	9,596
13.0	-	-	-	-	7,140	9,924
13.5	-	-	-	-	6,766	10,280
14.0	-	-	-	-	7,010	10,134
14.5	-	-	-	-	7,500	10,902
15.0	-	-	-	-	9,100	9,982

TABLE 1 (continued)

Page 3 of 7

Depth (ft)	Coordinates					
	K09640 N09960	K09700 N09945	K09780 N09980	K09850 N10000	K09850 N10012	K09900 N09995
0.5	6,000	15,464	-d-	-d-	26,906	43,000
1.0	4,000	27,408	-	-	19,058	38,000
1.5	4,000	61,420	-	-	16,305	44,000
2.0	5,000	168,540	-	-	14,963	66,000
2.5	8,000	173,420	-	-	11,674	51,000
3.0	11,000	188,680	-	-	12,423	30,000
3.5	8,000	116,960	-	-	12,904	19,000
4.0	7,000	112,580	-	-	12,998	11,000
4.5	7,000	74,170	-	-	11,812	9,000
5.0	8,000	24,052	-	-	10,051	8,000
5.5	9,000	13,825	-	-	10,085	8,000
6.0	9,000	8,734	-	-	-	8,500
6.5	9,000	7,557	-	-	-	11,000
7.0	8,000	7,558	-	-	-	17,000
7.5	7,000	8,523	-	-	-	30,000
8.0	6,000	8,837	-	-	-	39,000
8.5	6,000	9,161	-	-	-	56,000
9.0	8,000	9,317	-	-	-	33,000
9.5	10,000	9,549	-	-	-	14,000
10.0	13,000	9,175	-	-	-	10,000
10.5	12,000	8,837	-	-	-	9,000
11.0	12,000	9,091	-	-	-	9,000
11.5	12,000	10,545	-	-	-	10,000
12.0	12,000	12,296	-	-	-	10,000
12.5	13,000	13,762	-	-	-	11,000
13.0	-	12,821	-	-	-	10,000
13.5	-	12,001	-	-	-	11,000
14.0	-	12,321	-	-	-	10,000
14.5	-	12,904	-	-	-	10,000
15.0	-	12,669	-	-	-	8,400

TABLE 1 (continued)

Page 4 of 7

Depth (ft)	Coordinates					
	E09900 N10012	E09900 N10025	E09950 N10025	E09950 N10012	E09987 N10025	E09995 N10010
0.5	66,160	33,150	39,736	-e-	32,269	42,400
1.0	44,445	18,182	25,725	-	24,629	40,248
1.5	58,253	17,193	26,667	-	18,576	29,050
2.0	78,330	13,899	-	-	17,392	22,406
2.5	53,572	13,453	-	-	17,193	18,700
3.0	66,010	14,161	-	-	17,965	17,627
3.5	91,610	-	-	-	19,355	18,566
4.0	144,930	-	-	-	21,127	20,910
4.5	189,880	-	-	-	-	22,286
5.0	211,270	-	-	-	-	25,008
5.5	157,070	-	-	-	-	35,544
6.0	-	-	-	-	-	60,150
6.5	-	-	-	-	-	115,500
7.0	-	-	-	-	-	141,600
7.5	-	-	-	-	-	188,650
8.0	-	-	-	-	-	102,500
8.5	-	-	-	-	-	78,900
9.0	-	-	-	-	-	64,696
9.5	-	-	-	-	-	50,088
10.0	-	-	-	-	-	47,960
10.5	-	-	-	-	-	45,638
11.0	-	-	-	-	-	41,862
11.5	-	-	-	-	-	37,698
12.0	-	-	-	-	-	29,866
12.5	-	-	-	-	-	29,790
13.0	-	-	-	-	-	-
13.5	-	-	-	-	-	-
14.0	-	-	-	-	-	-
14.5	-	-	-	-	-	-
15.0	-	-	-	-	-	-

TABLE 1 (continued)

Page 5 of 7

Depth (ft)	Coordinates					
	E10050 N10012	E10025 N10037	E10050 N10025	E10100 N10025	E10125 N10025	E10137 N10025
0.5	135,170	89,110	26,554	122,450	256,870	425,540
1.0	160,430	110,102	20,135	45,768	240,010	279,080
1.5	180,840	66,115	-	19,484	143,910	87,720
2.0	152,730	39,406	-	15,307	60,250	56,117
2.5	220,590	31,112	-	10,001	31,414	35,939
3.0	252,140	29,117	-	8,597	26,786	41,096
3.5	168,540	-	-	8,065	26,559	-
4.0	99,020	-	-	9,010	-	-
4.5	86,560	-	-	9,647	-	-
5.0	58,824	-	-	-	-	-
5.5	-	-	-	-	-	-
6.0	-	-	-	-	-	-
6.5	-	-	-	-	-	-
7.0	-	-	-	-	-	-
7.5	-	-	-	-	-	-
8.0	-	-	-	-	-	-
8.5	-	-	-	-	-	-
9.0	-	-	-	-	-	-
9.5	-	-	-	-	-	-
10.0	-	-	-	-	-	-
10.5	-	-	-	-	-	-
11.0	-	-	-	-	-	-
11.5	-	-	-	-	-	-
12.0	-	-	-	-	-	-
12.5	-	-	-	-	-	-
13.0	-	-	-	-	-	-
13.5	-	-	-	-	-	-
14.0	-	-	-	-	-	-
14.5	-	-	-	-	-	-
15.0	-	-	-	-	-	-

TABLE 1 (continued)

Page 6 of 7

Depth (ft)	Coordinates					
	E10150 N10025	E10150 N10050	E10175 N10037	E10175 N10050	E10200 N10037	E10225 N10025
0.5	159,580	32,000	37,000	30,000	315,790	472,450
1.0	163,940	26,000	35,000	24,000	147,060	303,040
1.5	75,670	24,000	32,000	20,000	53,572	170,460
2.0	41,984	14,000	27,000	-	40,817	101,700
2.5	22,999	14,000	-	-	36,586	-
3.0	-	-	-	-	37,490	-
3.5	-	-	-	-	-	-
4.0	-	-	-	-	-	-
4.5	-	-	-	-	-	-
5.0	-	-	-	-	-	-
5.5	-	-	-	-	-	-
6.0	-	-	-	-	-	-
6.5	-	-	-	-	-	-
7.0	-	-	-	-	-	-
7.5	-	-	-	-	-	-
8.0	-	-	-	-	-	-
8.5	-	-	-	-	-	-
9.0	-	-	-	-	-	-
9.5	-	-	-	-	-	-
10.0	-	-	-	-	-	-
10.5	-	-	-	-	-	-
11.0	-	-	-	-	-	-
11.5	-	-	-	-	-	-
12.0	-	-	-	-	-	-
12.5	-	-	-	-	-	-
13.0	-	-	-	-	-	-
13.5	-	-	-	-	-	-
14.0	-	-	-	-	-	-
14.5	-	-	-	-	-	-
15.0	-	-	-	-	-	-

TABLE 1 (continued)

Page 7 of 7

Depth (ft)	Coordinates				
	K10250 N10025	K10262 N10112	K10267 N10012	K10275 N10037	K10300 N10050
0.5	269,060	33,000	66,255	58,523	44,000
1.0	152,290	30,000	49,136	36,145	25,000
1.5	62,380	24,000	39,145	17,658	23,000
2.0	35,295	-	28,166	15,585	-
2.5	-	-	24,135	15,239	-
3.0	-	-	26,115	15,152	-
3.5	-	-	- f -	-	-
4.0	-	-	-	-	-
4.5	-	-	-	-	-
5.0	-	-	-	-	-
5.5	-	-	-	-	-
6.0	-	-	-	-	-
6.5	-	-	-	-	-
7.0	-	-	-	-	-
7.5	-	-	-	-	-
8.0	-	-	-	-	-
8.5	-	-	-	-	-
9.0	-	-	-	-	-
9.5	-	-	-	-	-
10.0	-	-	-	-	-
10.5	-	-	-	-	-
11.0	-	-	-	-	-
11.5	-	-	-	-	-
12.0	-	-	-	-	-
12.5	-	-	-	-	-
13.0	-	-	-	-	-
13.5	-	-	-	-	-
14.0	-	-	-	-	-
14.5	-	-	-	-	-
15.0	-	-	-	-	-

^a Counts per minute

^b DOE subsurface criteria of 15 pCi/g is equivalent to 40,000 counts per minute.

^c Last depth given indicates the bottom of the hole; applies to all coordinates.

^d Contaminated to 5 feet

^e Pond edge, not able to drill

^f Hole collapsed