

046649

M-121

DOE/OR/20722-154

---

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

---

**RADIOLOGICAL CHARACTERIZATION  
REPORT FOR THE  
FEDERAL EXPRESS PROPERTY**

**Maywood, New Jersey**

---

July 1987



Bechtel National, Inc.

RADIOLOGICAL CHARACTERIZATION REPORT FOR  
THE FEDERAL EXPRESS PROPERTY  
MAYWOOD, NEW JERSEY

JULY 1987

Prepared for

UNITED STATES DEPARTMENT OF ENERGY  
OAK RIDGE OPERATIONS OFFICE  
Under Contract No. DE-AC05-81OR20722

By

N. C. Ring and S. K. Livesay  
Bechtel National, Inc.  
Oak Ridge, Tennessee  
Bechtel Job No. 14501

046649

# 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

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

JUL 31 1987

Attention: S. W. Ahrends, Director  
Technical Services Division

Subject: Bechtel Job No. 14501, FUSRAP Project  
DOE Contract No. DE-AC05-81OR20722  
Publication of the Radiological Characterization  
Report for the Federal Express Property in Maywood,  
New Jersey  
Code: 7310/WBS: 138

Dear Mr. Ahrends:

The following is the response to comments in Steve Oldham's letter (87-388) dated June 22 (our CCN 045685) and additional information exchanged during telephone conversations between Steve Oldham and Tom Dravecky on July 21 and 23. Enclosed are 25 copies of the subject report that incorporates these comments.

Also enclosed is a copy of CCN 35677, "Calibration and Functional Checks of Eberline Instrumentation," as requested by Steve Oldham. This item is the BNI trip report cited as reference in the Maywood and Lodi characterization reports.

Please contact Sherry Livesay (6-0454) if you need additional copies.

Very truly yours,

*J. R. Kannard*  
for J. R. Kannard  
Project Manager - FUSRAP

JRK/skl

Enclosure: As stated

cc: J. F. Wing, w/o  
R. G. Atkin, w/o  
S. K. Oldham, w/o  
B. A. Hughlett, w/o  
J. D. Berger (ORAU), w/e  
G. K. Hovey, w/o

CONCURRENCE

SKL	net	ack	CP	BB
-----	-----	-----	----	----

## TABLE OF CONTENTS

	<u>Page</u>
Abbreviations	v
1.0 Introduction and Summary	1
1.1 Introduction	1
1.2 Purpose and Objectives	1
1.3 Summary	2
2.0 Site Description and Background	3
3.0 Radiological Characterization	5
3.1 Remedial Action Guidelines	5
3.2 Surface Characterization	5
3.3 Subsurface Characterization	9
References	17
Appendix A Geologic Drill Logs for the Maywood Interim Storage Site - Federal Express	A-1

## LIST OF FIGURES

<u>Figure</u>	<u>Title</u>	<u>Page</u>
2-1	Location of the Federal Express Property	4
3-1	Sampling Locations at the Federal Express Property	7
3-2	Area of Surface Contamination at the Federal Express Property	8
3-3	Area of Subsurface Contamination at the Federal Express Property	11

## LIST OF TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>
3-1	Summary of Residual Contamination Guidelines for the Maywood Site	12
3-2	Downhole Gamma Logging Results for the Federal Express Property	14

## ABBREVIATIONS

cm	centimeter
cm <sup>2</sup>	square centimeter
cpm	counts per minute
dpm	disintegrations per minute
ft	foot
h	hour
in.	inch
l	liter
m	meter
m <sup>2</sup>	square meter
μR/h	microroentgens per hour
mi	mile
mi <sup>2</sup>	square mile
mrad/h	millirad per hour
mrem	millirem
mrem/yr	millirem per year
min	minute
ppb	parts per billion
ppm	parts per million
pCi/g	picocuries per gram
pCi/l	picocuries per liter
WL	working level

## 1.0 INTRODUCTION AND SUMMARY

### 1.1 INTRODUCTION

The 1984 Energy and Water Appropriations Act authorized the U.S. Department of Energy (DOE) to conduct a decontamination research and development project at four sites, including the site of the former Maywood Chemical Works (now owned by the Stepan Company) and its vicinity properties. The act was reauthorized in 1985. DOE has constructed the Maywood Interim Storage Site (MISS) on 11.7 acres of land west of the Stepan Company property. The Federal Express property is included as one of the MISS vicinity properties. The work is being administered by the Formerly Utilized Sites Remedial Action Program (FUSRAP), one of two remedial action programs under the direction of the DOE Division of Facility and Site Decommissioning Projects.

The U.S. Government initiated FUSRAP in 1974 to identify, clean up, or otherwise control sites where low-activity radioactive contamination (exceeding current guidelines) remains from the early years of the nation's atomic energy program or from commercial operations that resulted in conditions Congress has mandated DOE to remedy (Ref. 1).

FUSRAP is currently being managed by the DOE Oak Ridge Operations (ORO). As the Project Management Contractor (PMC) for FUSRAP, Bechtel National, Inc. (BNI) is responsible to DOE for planning, managing, and implementing FUSRAP.

### 1.2 PURPOSE AND OBJECTIVES

A radiological characterization of the Federal Express property has been conducted to establish the horizontal and vertical limits of radioactive contamination and to determine ranges of radionuclide concentrations. The information obtained from this characterization work will be used in planning any required remedial action. The

results will also be used to satisfy an important secondary objective, which is to provide data to aid in the identification and evaluation of pathways by which contamination might have migrated from the property.

### 1.3 SUMMARY

This report summarizes the procedures and results of the radiological characterization of the Federal Express property conducted in August and September 1986.

The radiological characterization confirmed that thorium-232 is the primary radioactive contaminant. A sediment sample showed the maximum concentration of thorium-232 to be 7.7 pCi/g above background, which is in excess of the DOE guideline of 5.0 pCi/g plus background for surface soil. The concentration of radium-226 was at the background level.

The results of downhole gamma logging indicated no subsurface contamination.



## 2.0 SITE DESCRIPTION AND BACKGROUND

The Federal Express property is in a highly developed area of the Borough of Maywood, County of Bergen, New Jersey. The population density of the area is approximately 10,000 people per square mile. It is located approximately 12 mi north-northwest of downtown Manhattan (New York City) and 13 mi northeast of Newark, New Jersey. The property is bounded by New Jersey Route 17 on the west and by other commercial properties on the north, east, and south. Figure 2-1 shows the location of the property.

The Federal Express property was shown to be radioactively contaminated during a radiological survey conducted in July 1983 by the NUS Corporation at the request of the U.S. Environmental Protection Agency (EPA) (Ref. 2). The contamination probably originated from the processing of monazite sand (thorium ore) by the Maywood Chemical Works from 1916 through 1956. During this time, slurry containing process wastes from the thorium operations was pumped to diked areas west of the plant. The area west of the plant was generally low and swampy at that time. In 1932, New Jersey Route 17 was built through this disposal area. Some of these process wastes were removed from the Maywood Chemical Works for use as mulch and fill on nearby properties, thereby contaminating them with radioactive thorium (Ref. 3). Additional waste apparently migrated off-site via the natural drainage provided by the former Lodi Brook.

In 1954, the Atomic Energy Commission (AEC) issued License R-103 to the Maywood Chemical Works allowing it to continue to ship, receive, possess, and process radioactive materials under the authority of the Atomic Energy Act of 1954. The Maywood Chemical Works stopped processing thorium in 1956 after approximately 40 years of production. The Maywood Chemical Works was sold to the Stepan Company in 1959 (Ref. 3).

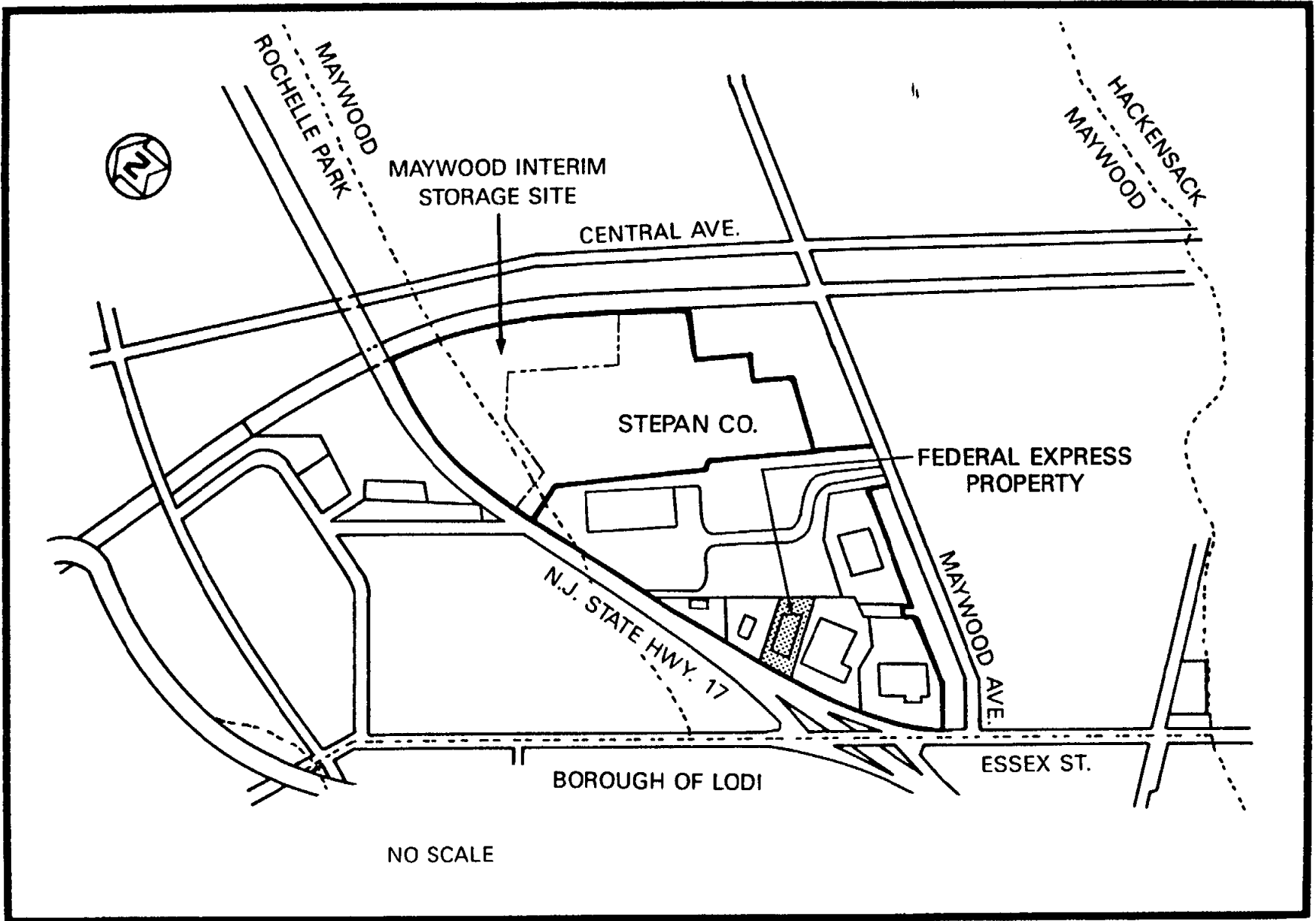


FIGURE 2-1 LOCATION OF THE FEDERAL EXPRESS PROPERTY

### 3.0 RADIOLOGICAL CHARACTERIZATION

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

To facilitate the collection of data in a systematic manner, a 50-ft grid was established across the area to be characterized. This grid was correlated with the New Jersey state grid system to ensure that it could be reestablished if remedial action is undertaken. All data correspond to coordinates on the characterization grid.

#### 3.1 REMEDIAL ACTION GUIDELINES

Information collected during the radiological survey conducted by the NUS Corporation (Ref. 2) indicated that the radioactive contamination at the Federal Express property consists primarily of thorium-232, with typically much lower levels of radium-226 and uranium-238. Thorium is also known to be the primary contaminant at the Stepan property (Ref. 3). Table 3-1 lists the DOE residual contamination guidelines governing the release of formerly contaminated property for unrestricted use (Ref. 4).

#### 3.2 SURFACE CHARACTERIZATION

Surface characterization was conducted with a shielded gamma scintillation detector. Near-surface gamma radiation measurements were taken 12 in. from the ground at the grid line intersections spaced 10 ft apart. The shielded detector was used to ensure that radiation detected by the probe originated from the ground directly beneath the unit. By shielding against lateral gamma flux, 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 correlation of counts per minute (cpm) to picocuries per

gram (pCi/g). On the basis of this relationship, locations with measurements of more than 11,000 cpm were noted as exceeding the DOE guideline of 5 pCi/g plus background for thorium-232 in surface soil/sediments. To better define the limits of contamination, a sediment sample location was chosen by evaluating locations with measurements of more than 11,000 cpm, locations with measurements at or near 11,000 cpm, and the potential for lateral gamma flux.

Near-surface gamma levels measured on the property are typically less than background level of 5,000 cpm. To identify surface areas where the level of contamination exceeds the guideline for thorium-232, areas having readings in excess of 11,000 cpm were plotted on a grid. In addition, near-surface gamma measurements indicate that contamination extends onto several properties contiguous with the Federal Express property.

A sediment sample taken from the ditch along the eastern boundary of the property [Coordinates N8410, E11312 (Figure 3-1)] was analyzed for uranium-238, thorium-232, and radium-226. The maximum thorium-232 concentration of 7.7 pCi/g in the sample exceeds the guideline for thorium-232 in surface soil/sediments. The maximum concentration of radium-226 is 1.3 pCi/g, which is less than the DOE guideline of 5 pCi/g plus background for surface soil/sediments. No uranium-238 concentration above laboratory detection limits was identified.

Since the thorium-232 concentration of the sediment sample exceeds the DOE guideline of 5 pCi/g above background, it has been demonstrated to be the site's primary radioactive contaminant.

Additional samples could not be collected because of heavy undergrowth in this section of the property. Figure 3-2 shows the area of surface contamination.

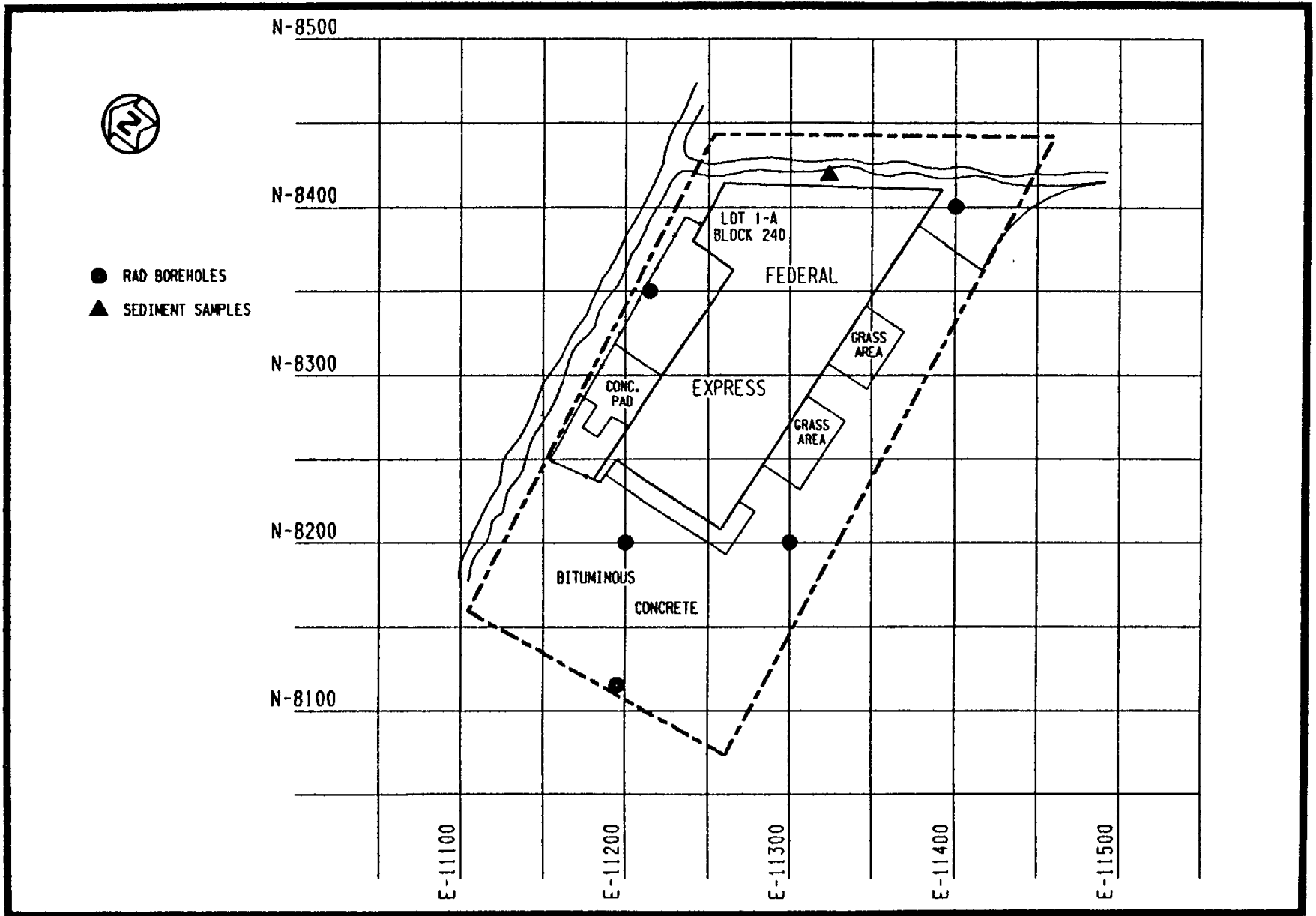


FIGURE 3-1 SAMPLING LOCATIONS AT THE FEDERAL EXPRESS PROPERTY

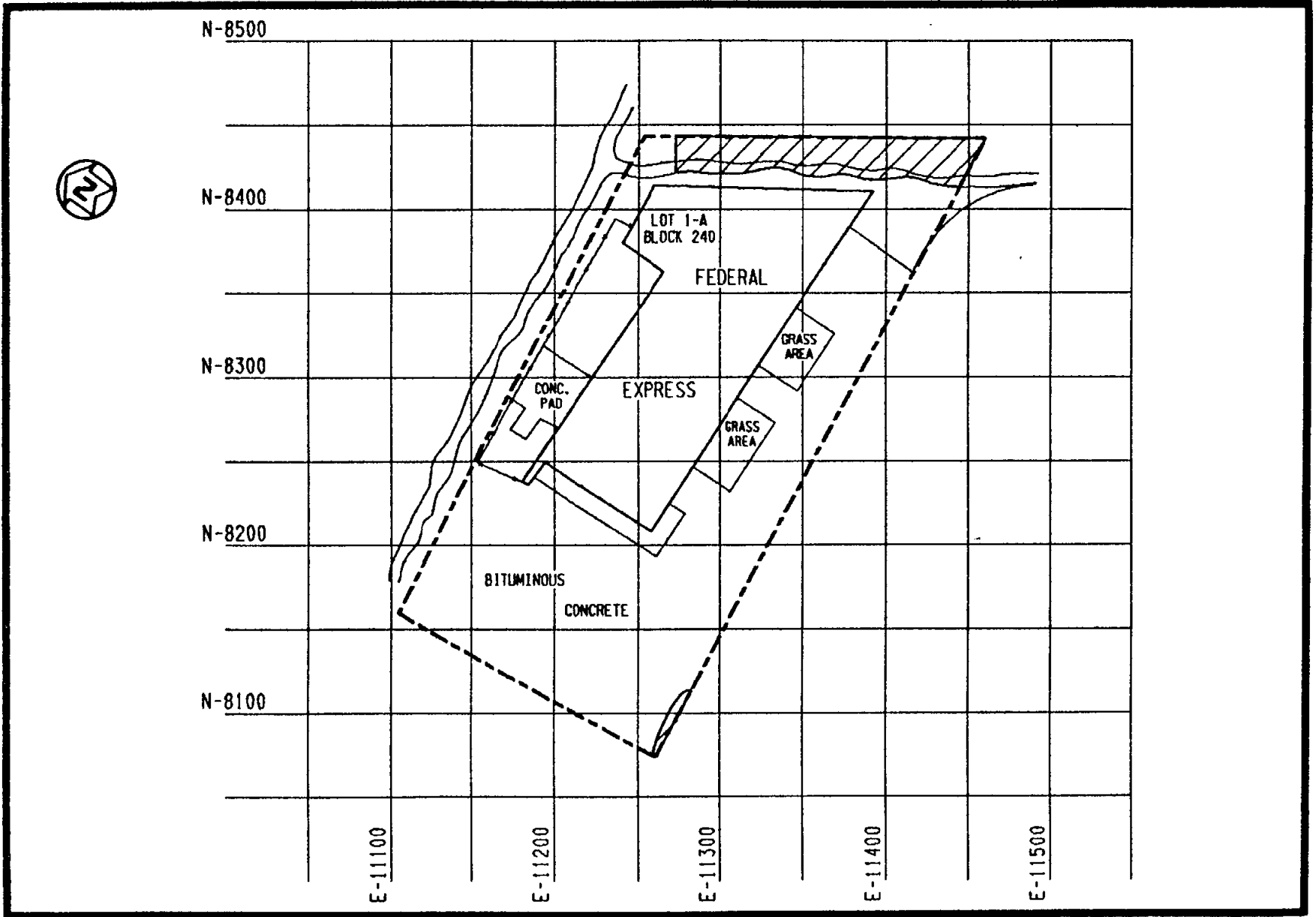


FIGURE 3-2 AREA OF SURFACE CONTAMINATION AT THE FEDERAL EXPRESS PROPERTY

### 3.3 SUBSURFACE CHARACTERIZATION

After surface characterization was completed, a subsurface investigation was conducted to determine the depth of previously identified surface contamination and to locate subsurface contamination with no surface manifestation. The subsurface investigation was conducted using downhole gamma logging of the drill holes. 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.

A 2-in. by 2-in. sodium iodide gamma scintillation detector was used to perform the downhole logging. The instrument was calibrated at TMC, where it was determined that a count rate of approximately 40,000 cpm corresponds to the 15-pCi/g guideline for thorium-232 in subsurface soil. This relationship has been corroborated in results from previous characterizations where thorium-232 was found (Ref. 5).

During the course of the subsurface investigation, five 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 guideline. Borehole locations are shown in Figure 3-1. Detailed gamma logging data are presented in Table 3-2. On the basis of the evaluation of the vertical gamma logging data, no instrument readings indicate the presence of soil in which contamination exceeds 15 pCi/g.

The ditch located along the eastern boundary of the property was found to contain stream sediments with contamination in excess of the guideline for surface soil. Heavy undergrowth throughout the ditch prohibited drilling in this area. The ditch appears to be a barrier to the contamination. Information obtained during the characterization of the adjacent property to the north and east indicates that contamination immediately adjacent to this area is as deep as 5 ft. Therefore, the potential exists for contamination to

exist to the same depth in this ditch. The area of subsurface contamination is shown in Figure 3-3.

On the basis of geological information gained as a result of this characterization, it was determined that the site is relatively flat (total measured relief of 2.0 ft) with the lowest elevation in the southwest (44.2 ft m.s.l.) and the highest in the northeast (maximum elevation of 46.2 ft m.s.l.).

Geological evidence indicates that the current drainage ditch for southward moving groundwater is man-made and the original channel existed farther east in the Federal Express property. A cumulose soil consisting of black organic silt is the characteristic marker bed of this former stream channel and wetland environment. During development of the site, the soil was mechanically disturbed, leaving thick accumulations near the present man-made channel and exposing underlying Brunswick sandstone in other areas. The entire property was then covered with fill to bring the surface up to the present grade, resulting in the current flatness of the site. The site is bordered on the north and east by man-made drainage ditches.



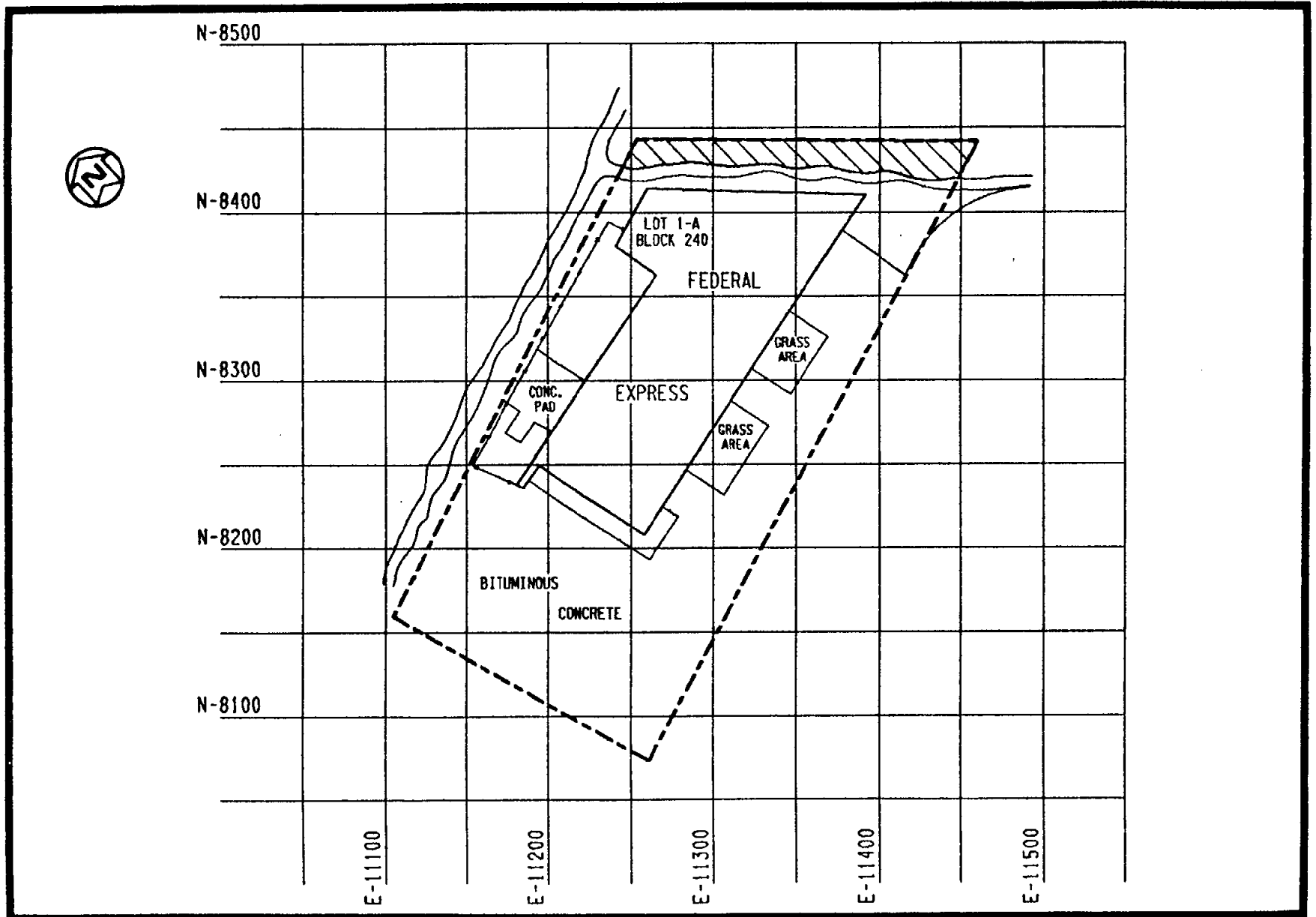


FIGURE 3-3 AREA OF SUBSURFACE CONTAMINATION AT THE FEDERAL EXPRESS PROPERTY

TABLE 3-1

## SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES FOR THE MAYWOOD SITE

Page 1 of 2

BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 100 mrem/yr.

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

<u>Radionuclide</u>	<u>Soil Concentration (pCi/g) above background<sup>a,b,c</sup></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.<sup>d</sup> 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.

External Gamma Radiation

The average level of gamma radiation inside a building or habitable structure on a site to be released for unrestricted use shall not exceed the background level by more than 20  $\mu$  R/h.

Indoor/Outdoor Structure Surface Contamination

<u>Radionuclide<sup>f</sup></u>	<u>Allowable Residual Surface Contamination<sup>e</sup></u> (dpm/100 cm <sup>2</sup> )		
	<u>Average<sup>g,h</sup></u>	<u>Maximum<sup>h,i</sup></u>	<u>Removable<sup>h,j</sup></u>
Transuranics, Ra-226, Ra-228, Th-230, Th-228 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

TABLE 3-1  
(continued)

Page 2 of 2

Indoor/Outdoor Structure Surface Contamination (continued)

<u>Radionuclide<sup>f</sup></u>	<u>Allowable Residual Surface Contamination<sup>e</sup></u> (dpm/100 cm <sup>2</sup> )		
	<u>Average<sup>g,h</sup></u>	<u>Maximum<sup>h,i</sup></u>	<u>Removable<sup>h,j</sup></u>
U-Natural, U-235, U-238, and associated decay products	5,000 α	15,000 α	1,000 α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 β-γ	15,000 β-γ	1,000 β-γ

<sup>a</sup>These guidelines take into account ingrowth of radium-226 from thorium-230 and of radium-228 from thorium-232, and assume secular equilibrium. If either thorium-230 and radium-226 or thorium-232 and radium-228 are both present, not in secular equilibrium, the guidelines apply to the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that the dose for the mixtures will not exceed the basic dose limit.

<sup>b</sup>These guidelines represent unrestricted-use residual concentrations above background averaged across any 15-cm-thick layer to any depth and over any contiguous 100-m<sup>2</sup> surface area.

<sup>c</sup>Localized concentrations in excess of these limits are allowable provided that the average concentration over a 100-m<sup>2</sup> area does not exceed these limits.

<sup>d</sup>A 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  $1.3 \times 10^5$  MeV of potential alpha energy.

<sup>e</sup>As 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.

<sup>f</sup>Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

<sup>g</sup>Measurements of average contamination should not be averaged over more than 1 m<sup>2</sup>. For objects of less surface area, the average shall be derived for each such object.

<sup>h</sup>The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

<sup>i</sup>The maximum contamination level applies to an area of not more than 100 cm<sup>2</sup>.

<sup>j</sup>The amount of removable radioactive material per 100 cm<sup>2</sup> of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and 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 cm<sup>2</sup> 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 3-2

DOWNHOLE GAMMA LOGGING RESULTS  
FOR THE FEDERAL EXPRESS PROPERTY

Page 1 of 3

Coordinates		Depth (a) (ft)	Counts per Minute
East	North		
11195	8115	0.5	10000
11195	8115	1.0	12000
11195	8115	1.5	13000
11195	8115	2.0	14000
11195	8115	2.5	13000
11195	8115	3.0	13000
11195	8115	3.5	11000
11195	8115	4.0	11000
11195	8115	4.5	10000
11195	8115	5.0	9000
11195	8115	5.5	10000
11195	8115	6.0	9000
11195	8115	6.5	9000
11195	8115	7.0	9000
11195	8115	7.5	10000
11195	8115	8.0	10000
11195	8115	8.5	12000
11195	8115	9.0	15000
11195	8115	9.5	18000
11200	8200	0.5	8000
11200	8200	1.0	14000
11200	8200	1.5	20000
11200	8200	2.0	17000
11200	8200	2.5	14000
11200	8200	3.0	11000
11200	8200	3.5	10000
11200	8200	4.0	9000
11200	8200	4.5	10000
11200	8200	5.0	10000
11200	8200	5.5	11000
11200	8200	6.0	9000
11200	8200	6.5	8000
11200	8200	7.0	8000
11200	8200	7.5	8000
11215	8350	0.5	8000
11215	8350	1.0	9000
11215	8350	1.5	12000
11215	8350	2.0	15000
11215	8350	2.5	16000
11215	8350	3.0	15000

TABLE 3-2  
(continued)

Page 2 of 3

Coordinates		Depth (a) (ft)	Counts per Minute
East	North		
11215	8350	3.5	13000
11215	8350	4.0	12000
11215	8350	4.5	12000
11215	8350	5.0	12000
11215	8350	5.5	12000
11215	8350	6.0	10000
11215	8350	6.5	9000
11215	8350	7.0	9000
11215	8350	7.5	9000
11215	8350	8.0	9000
11215	8350	8.5	8000
11215	8350	9.0	7000
11300	8200	0.5	7000
11300	8200	1.0	9000
11300	8200	1.5	9000
11300	8200	2.0	10000
11300	8200	2.5	11000
11300	8200	3.0	12000
11300	8200	3.5	11000
11300	8200	4.0	10000
11300	8200	4.5	10000
11300	8200	5.0	10000
11300	8200	5.5	11000
11300	8200	6.0	10000
11300	8200	6.5	9000
11300	8200	7.0	9000
11300	8200	7.5	11000
11300	8200	8.0	12000
11300	8200	8.5	11000
11300	8200	9.0	11000
11300	8200	9.5	11000
11400	8400	0.5	8000
11400	8400	1.0	9000
11400	8400	1.5	14000
11400	8400	2.0	17000
11400	8400	2.5	16000
11400	8400	3.0	16000
11400	8400	3.5	15000
11400	8400	4.0	15000
11400	8400	4.5	15000

TABLE 3-2  
(continued)

Page 3 of 3

Coordinates		Depth (a) (ft)	Counts per Minute
East	North		
11400	8400	5.0	13000
11400	8400	5.5	10000
11400	8400	6.0	9000
11400	8400	6.5	9000
11400	8400	7.0	9000
11400	8400	7.5	9000
11400	8400	8.0	9000
11400	8400	8.5	8000
11400	8400	9.0	8000
11400	8400	9.5	9000
11400	8400	10.0	8000
11400	8400	10.5	9000
11400	8400	11.0	8000

(a) The variations in depths of boreholes and corresponding results given in this table are based on the boreholes penetrating the contamination or the drill reaching refusal.

## REFERENCES


1. U.S. Department of Energy. Description of the Formerly Utilized Sites Remedial Action Program, ORO-777, Oak Ridge, TN, September 1980 (as modified by DOE in October 1983).
2. NUS Corporation, Radiological Study of Maywood Chemical, Maywood, New Jersey, R-584-11-83-1, November 1983.
3. Morton, Henry W., Natural Thorium in Maywood, New Jersey, Nuclear Safety Associates, Inc., Potomac, MD, September 29, 1982.
4. U.S. Department of Energy. "U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites," Rev. 1, July 1985.
5. Trip Report, C. P. Leichtweis, Bechtel National, Inc., to File. "Calibration and Functional Checks of Eberline Instrumentation," CCN 35677, March 25, 1986.

APPENDIX A  
GEOLOGIC DRILL LOGS FOR THE  
MAYWOOD INTERIM STORAGE SITE - FEDERAL EXPRESS





046649

GEOLOGIC DRILL LOG										PROJECT		JOB NO.		SHEET NO.		HOLE NO.	
SITE MAYWOOD INTERIM STORAGE SITE- FEDERAL EXPRESS										COORDINATES N8400,E11400				ANGLE FROM HORIZ. 90°		BEARING N/A	
BEGIN 6/20/86		COMPLETED 6/28/86		DRILLER MORETRENCH ENVIRONMENTAL SERVICES			DRILL WARE AND MODEL MOBILE B-33			HOLE SIZE 6"	OVERLAP (FT.) 10.0'	ROCK (FT.) 1.5'	TOTAL DEPTH 11.5'				
CORE RECOVERY (FT./30) N/A			CORE BOXES N/A		SAMPLES N/A	DL. TOP OF CASING N/A		GROUND CL. 45.3'		DEPTH/VEL. GROUND WATER 6.0'/39.3'		DEPTH/VEL. TOP OF ROCK 10.0'/35.3'					
SAMPLE NUMBER NUMBER/FALL N/A				CASING LEFT IN HOLE; DIA./LENGTH N/A				LOGGED BY: P. YEN									
SAMPLE TYPE AND DIAMETER	SAMPLED APPROX. LENGTH CORE IN IN.	SAMPLE RECOVERY CODE RECOVERY	SAMPLE BLINDS Y	PERCENT CORE RECOVERY	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.				
					LOG IN FT. IN	P. G.P.A.	PRESSURE P.S.I.							TIME IN MINUTES			
AUGER 6" THROUGHOUT								45.3	0				SITE CHECKED FOR RADIOACTIVE CONTAMINATION BY EBERLINE ANALYTICAL CORPORATION.   6/20/86  EBERLINE ANALYTICAL CORPORATION PERFORMED GAMMA LOGGING.				
							43.8	1.5			0.0-1.5': SILT AND CRUSHED ROCK OIL-GAS; GRAYISH BROWN (SYR3/2). 1.5-10.0': SAND (SC-SM), FINE-GRAINED, GENERALLY SILTY. 1.5-5.0': DUSKY RED (SR3/4), BRICK FRAGMENTS NOTED AT 4.0 FT. 5.0-6.0': DUSKY BROWN (SYR2/2). 7.0-9.0': YELLOWISH GRAY (SYB/B). 9.0-10.0': BROWNISH BLACK (SYR2/B), LIGHT GRAY (TRACE) (OT), BECOMES MORE CLAYEY WITH LIGHT GRAY SPECKS.						
							35.3 33.8	10 11.5			10.0-11.5': SANDSTONE; DUSKY RED (SR3/4), SOFT TO MODERATELY HARD, FINE-GRAINED, SILTY, WEATHERED, SATURATED.						
												BOTTOM OF HOLE AT 11.5 FT. HOLE BACKFILLED WITH CEMENT-BENTONITE GROUT, 6/20/86.	AUGER REFUSAL AT 11.5 FT.				
SS-SPLIT SPOON ST-SHELBY TUBE; D-DIBSONS P-PITCHER; O-OTHER												NOTE MAYWOOD INTERIM STORAGE SITE- FEDERAL EXPRESS		HOLE NO. MISS-123R			



GEOLOGIC DRILL LOG				PROJECT		JOB NO.	SHEET NO.	HOLE NO.					
				FUSRAP		14501-138	1 OF 1	MISS-126R					
SITE				COORDINATES			ANGLE FROM VERT.						
MAYWOOD INTERIM STORAGE SITE - FEDERAL EXPRESS				N8200, E11200			90°						
BEGAN	COMPLETED	DRIILLER	DRIILL NAME AND MODEL		HOLE SIZE	OVERLAP (FT.)	ROCK (FT.)	TOTAL DEPTH					
6/23/86	6/23/86	MORETRENCH ENVIRONMENTAL SERVICES	MOBILE B-33		6"	6.0'	7.0'	13.0'					
CORE RECOVERY (FT./%)		CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK					
N/A		N/A	N/A	N/A	44.7'	5.0' / 39.7'		6.0' / 39.7'					
SAMPLE NUMBER BEING / FALL			CASING LEFT IN HOLE DIA./LENGTH			LOGGED BY:							
N/A			N/A			P. YEN							
SAMPLE TYPE AND DIAMETER	SAMPLER APPROX. LENGTH CORE RUN	SAMPLE INTERVAL CORE RECOVERY	SAMPLE BLOCKS	PERCENT CORE RECOVERY	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION *	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOGS	TIME	TIME						
Auger, 6" THROUGHOUT.					LOGS	TIME	TIME	44.7	0				SITE CHECKED FOR RADIOACTIVE CONTAMINATION BY EBERLINE ANALYTICAL CORPORATION.  6/25/86  EBERLINE ANALYTICAL CORPORATION PERFORMED GAMMA LOGGING.
								44.2	0.5		0.0-0.5: ASPHALT; GRAYISH BLACK GR2.		
								43.7	1.0		0.5-1.0: CRUSHED ROCK; DARK GRAY DSD, BASALT, ANGULAR, 2" MINUS.		
											1.0-6.0: SAND (SC-SM) FINE-GRAINED, SILTY, DRY TO MOIST. 1.0-2.5: DUSKY RED (SR3/4). 2.5-4.0: GRAYISH BROWN (SYR3/2). 4.0-6.0: LIGHT OLIVE GRAY (SY5/2), CLAYEY.		
								38.7	6		6.0-13.0: SANDSTONE; PALE YELLOWISH BROWN (OYR6/2), SOFT, FINE-GRAINED, SILTY, WEATHERED, SATURATED 00.0-13.0 FT.		
								31.7	13.0		BOTTOM OF HOLE AT 13.0 FT. HOLE BACK-FILLED WITH CEMENT-BENTONITE GROUT, 6/25/86.		

\* DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.



046649

GEOLOGIC DRILL LOG			PROJECT FUSRAP			JOB NO. 14501-138	SHEET NO. 1 OF 1	HOLE NO. MISS-127R				
SITE MAYWOOD INTERIM STORAGE SITE- FEDERAL EXPRESS			COORDINATES N8200, E11300				ANGLE FROM NORM. 90°	BEARING N/A				
DATE 6/23/86	COMPLETED 6/23/86	DRILLER MORETRENCH ENVIRONMENTAL SERVICES		DRILL MAKE AND MODEL MOBILE B-33		HOLE SIZE 6"	OVERLAP (FT.) 10.0'	ROCK (FT.) 0.0'	TOTAL DEPTH 18.0'			
CORE RECOVERY FT./% N/A		CORE BOXES N/A	SAMPLES N/A	EL. TOP OF CASING N/A	GROUND EL. 45.6'	DEPTH/EL. GROUND WATER 5.0'/40.6'		DEPTH/EL. TOP OF ROCK N/A				
SAMPLE NUMBER NONE/FULL N/A		CASING LEFT IN HOLE DIA./LENGTH N/A			LOGGED BY P. YEN							
SAMPLE TYPE AND DIAMETER	SAMPLE ADVANCE LENGTH CORE BAR	SAMPLE RECOVERY CORE RECOVERY	SAMPLE LOSS PERCENT CORE RECOVERY	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION *	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
				LOSS IN FT. IN P.S.F.	PRESSURE IN P.S.F.	TIME IN MINUTES						
AUGER, 6", THROUGHOUT.							45.6	0				
							45.1	0.5			0.0-0.5': ASPHALT; GRAYISH BLACK GRG.	SITE CHECKED FOR RADIOACTIVE CONTAMINATION BY EBERLINE ANALYTICAL CORPORATION.  6/25/86  EBERLINE ANALYTICAL CORPORATION PERFORMED GAMMA LOGGING.
						44.6	1.0			0.5-1.0': CRUSHED ROCK; DARK GRAY GRG. BASALT, ANGULAR, 2" MINUS.		
										1.0-10.0': SAND (SC-SM) FINE-GRAINED, SILTY, SLIGHTLY CLAYEY, MOIST TO SATURATED. 1.0-4.5': LIGHT BROWN (SYR6/4). 4.5-10.0': GREENISH GRAY (SGY6/7).		
							35.6	10			BOTTOM OF HOLE AT 18.0 FT. HOLE BACK-FILLED WITH CEMENT-BENTONITE GROUT, 6/25/86.	

\* DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.

SS-SPLIT SPOON; ST-SHELBY TUBE; D-DRECHER; P-PITCHER; O-OTHER

SITE MAYWOOD INTERIM STORAGE SITE- FEDERAL EXPRESS

HOLE NO. MISS-127R



043549

GEOLOGIC DRILL LOG					PROJECT			JOB NO.		SHEET NO.		HOLE NO.			
					FUSRAP			14501-138		1 OF 1		MISS-288R			
SITE MAYWOOD INTERIM STORAGE SITE - FEDERAL EXPRESS					COORDINATES					ANGLE FROM HORIZ.		BEARING			
					N0115, E11195					90°		N/A			
BEGIN		COMPLETED		DRILLER			DRILL MAKE AND MODEL		HOLE SIZE		OVERBURDEN (FT.)		ROCK (FT.)		
8/5/86		8/5/86		MORETRENCH ENVIRONMENTAL SERVICES			MOBILE B-33		6"		10.0'		0.0		
CORE RECOVERY(FT./TD)				CORE DIAMETER		SAMPLES		EL. TOP OF CASING		GROUND EL.		DEPTH/VEL. GROUND WATER		DEPTH/VEL. TOP OF ROCK	
N/A				N/A		N/A		N/A		44.2'		6.0' / 38.2'		N/A	
SAMPLE NUMBER BEGIN/FALL				CASING LEFT IN HOLE DIA./DEPTH				LOGGED BY							
N/A				N/A				D. McGRANE							
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS PER CENT CORE RECOVERY	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION *	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.			
				LOSS IN PRESSURE P.S.I.	TIME IN MINUTES	TIME IN HOURS									
AUGER, 6", THROUGHOUT.							44.2	0							
							43.9	0.3		0.0-0.3: ASPHALT. 0.3-10.0: SILTY SAND (SH-SCL) COLOR STRATIFIED SOIL HORIZONS: FINE-TO MEDIUM-GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE) WITH ONE CLAYEY DENSE LAYER (4.5-5.0 FT); NUMEROUS PIECES OF SANDSTONE GRAVEL. 0.3-1.0: MODERATE BROWN (SYR3/4L) 1.0-4.5: DARK REDDISH BROWN (OR3/4L) 4.5-5.0: CLAYEY LAYER; GRAY (NSL) 5.0-10.0: DARK REDDISH BROWN; MANY FINES.	SITE CHECKED FOR RADIOACTIVE CONTAMINATION AND HOLE GAMMA LOGGED BY EBERLINE ANALYTICAL CORPORATION.  8/10/86  NIGHT DRILLING - COLORS MAY BE SLIGHTLY DIFFERENT.				
							34.2	10		BOTTOM OF HOLE AT 10.0 FT. AUGER SPOILS WERE IMMEDIATELY REPLACED IN THE HOLE AND THE HOLE WAS RESEALED WITH ASPHALT.					


SS-SPLIT SPOON; ST-SHELBY TUBE;  
D-DEBRIS; P-PITCHER; O-OTHER

BVE

MAYWOOD INTERIM STORAGE SITE - FEDERAL EXPRESS

HOLE NO.

MISS-288R

GEOLOGIC DRILL LOG				PROJECT		JOB NO.		SHEET NO.		HOLE NO.			
				FUSRAP		14501-138		1 OF 1		MISS-403R			
SITE MAYWOOD INTERIM STORAGE SITE - FEDERAL EXPRESS				COORDINATES				ANGLE FROM HORIZ.		BEARING			
				N0350,E11215				90°		N/A			
DRILLER		COMPLETED		DRILLER		MOBILE MAKE AND MODEL		HOLE SIZE		OVERALL DEPTH (FT)			
8/8/86		8/8/86		MORE TRENCH ENVIRONMENTAL SERVICES		MOBILE B-33		6"		8.0'			
CORE RECOVERY (FT./TD)			CORE BOXES		SAMPLES		EL. TOP OF CASING		GROUND EL.		DEPTH/VEL. GROUND WATER		
N/A			N/A		N/A		N/A		46.2'		4.0' / 44.2'		
DEPTH/VEL. TOP OF ROCK			CASING LEFT IN HOLE; DIA./LENGTH		LOGGED BY:								
8.0' / 38.2'			N/A		D MCGRANE								
SAMPLE TYPE AND DIAMETER	SAMPLE INTERVAL LENGTH (CORE RUN)	SAMPLE INTERVAL CORE RECOVERY	SAMPLE IN ONE PERCENT CORE RECOVERY	WATER PRESSURE TESTS				ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION *	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
				LONG IN P.S.I.	TEMP. IN P.S.I.	TIME IN MINUTES							
6" AUGER THROUGHOUT.							46.2	0			0.0-0.3: ASPHALT.	SITE CHECKED FOR RADIOACTIVE CONTAMINATION AND HOLE GAMMA LOGGED BY EBERLINE ANALYTICAL CORPORATION. 8/10/86. 	
							45.9	0.3			0.3-0.9: SILTY SAND (SH-SC) COLOR STRATIFIED; FINE-TO MEDIUM-GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE) WITH ONE DENSER CLAYEY ZONE (6.0-6.5 FT) MOST TO SATURATED AT 4.0 FT.		
								5			0.3-2.0: MODERATE BROWN (SYR3/4) WITH NUMEROUS PIECES OF DARK REDDISH BROWN (OR3/4) SANDSTONE GRAVEL.		
								8.5			2.0-6.0: DARK YELLOWISH BROWN (OYR4/2) WITH A FEW PIECES OF A WHITE CLAYEY MATERIAL; CLAYEY; CONTAINS PIECES OF METAL NAILS, SODA POP TOPS.		
								10			6.0-6.5: CLAYEY ZONE. PALE GREEN (SG7/2).		
								15			6.5-8.0: DARK YELLOWISH BROWN (OYR4/2).		
								20			8.0-8.5: DECOMPOSED SANDSTONE; DARK REDDISH BROWN (OR3/4); FINE-GRAINED (ARGILLACEOUS); SOFT TO MODERATELY HARD; POORLY CONSOLIDATED (LOOSE); TOTALLY DECOMPOSED TO HIGHLY WEATHERED; AUGER SPOILS CONSIST OF SILTY SAND (SM) AND GRAVEL; SATURATED.		
								25			BOTTOM OF HOLE AT 8.5 FT. HOLE BACKFILLED WITH CEMENT-BENTONITE GROUT, 8/10/86.		
								30					
								35					

\* DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.

86-SPLIT SPOON; ST-SHELBY TUBE; D-DEBRIS; P-PITCHER; O-OTHER

NOTE MAYWOOD INTERIM STORAGE SITE - FEDERAL EXPRESS

HOLE NO. MISS-403R

bcc: N. C. Ring (2)  
R. M. Howard  
C. P. Leichtweis  
R. C. Robertson  
W. C. Borden  
J. A. Blanke (2)  
S. G. Wilkinson  
L. A. Johnson (2)  
S. K. Livesay  
TRG (6)  
PDCC

This distribution closes out CCN 045685.