DOE/OR/20722-155

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

RADIOLOGICAL AND LIMITED CHEMICAL CHARACTERIZATION REPORT FOR THE SUNOCO STATION PROPERTY

Maywood, New Jersey

July 1987

Bechtel National, Inc.

046670

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AUG 3 1987

U.S. Department of Energy
Oak Ridge Operations
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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 and Limited Chemical Characterization Report for the Hunter Douglas Property in Maywood, New Jersey and Radiological and Limited Chemical Characterization Report for the Sunoco Station 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 each of the subject reports that incorporates these comments.

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

Very truly yours,

S. P. Eastwell

FOR J. R. Kannard
Project Manager - FUSRAP

JRK/skl

Enclosures: As stated

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This distribution closes out CCN 045685.

DOE/OR/20722-155

RADIOLOGICAL AND LIMITED CHEMICAL CHARACTERIZATION REPORT FOR THE SUNOCO STATION 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

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ABBREVIATIONS

cm	centimeter
cm^2	square centimeter
cpm	counts per minute
dpm	disintegrations per minute
ft	foot
h	hour
in.	inch
l	liter
m	meter
m^2	square meter
μR/h	microroentgens per hour
mi	mile
mi^2	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 Sunoco Station 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 Sunoco Station property has been conducted to establish the horizontal and vertical limits of 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. A limited chemical characterization was also performed to provide the information necessary for development of appropriate employee health protection measures to be implemented during any remedial action at the Sunoco Station property.

1.3 SUMMARY

This report summarizes the procedures and results of the radiological and limited chemical characterization of the Sunoco Station property conducted in August and September 1986.

1.3.1 Radiological Summary

The radiological characterization confirmed that thorium-232 is the primary radioactive contaminant. The sediment sample results showed the maximum concentration of thorium-232 to be 7.6 pCi/g, which is in excess of the DOE guideline of 5.0 pCi/g plus background for surface soil/sediments. The maximum concentration for radium-226 was 2.0 pCi/g, which does not exceed the guideline for surface soil/sediments. No uranium-238 concentration above the laboratory detection limit was identified.

The results of downhole gamma logging indicate subsurface contamination at depths ranging from 1 to 5 ft.

1.3.2 Chemical Summary

Results of volatile organic analysis (VOA) indicated the presence of methylene chloride, but this result may be an artifact (false positive result) because methylene chloride was used during field decontamination procedures and is also a common chemical contaminant in laboratory operations. However, only a general evaluation of the data is possible because the analytical laboratory contracted for

this work exceeded the holding times for these analyses. Analyses for base neutral/acid extractables (BNAE) (semi-volatiles) indicated that none were present in the sample. Priority pollutant metals analysis results indicated the presence of one hazardous constituent, cadmium, with a concentration above background level.

Results of the analyses for pesticides and PCBs showed no detectable levels of these constituents. In addition, the sample did not exhibit the hazardous waste characteristics of corrosivity, reactivity, or ignitability. Analysis results for extraction procedure (EP) toxicity indicated trace-level concentrations.

2.0 SITE DESCRIPTION AND BACKGROUND

The Sunoco Station 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 Sunoco Station 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 this property.

The Sunoco Station 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).

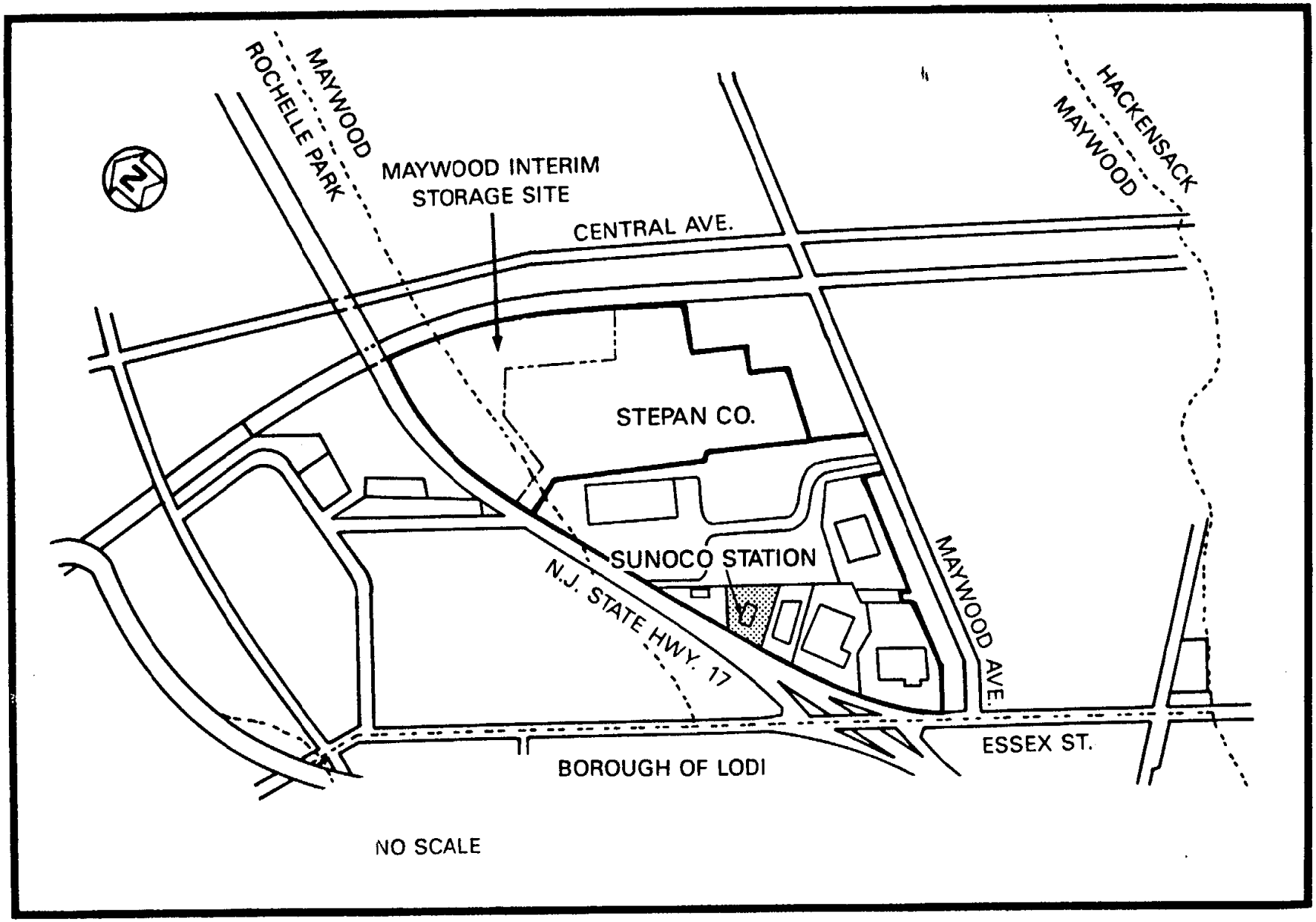

FIGURE 2-1 LOCATION OF THE SUNOCO STATION PROPERTY

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 over 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 Sunoco Station 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 (at the end of Section 3.0) 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, sediment sample locations were 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 ranged from less than background level of 5,000 cpm to 105,000 cpm. To identify surface areas where the level of contamination exceeds the DOE 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 Sunoco Station property.

The sediment sampling locations are shown in Figure 3-1. It should be noted that not all sediment samples indicated contamination because some samples were taken from locations where the gamma measurement was at or near the guideline.

The data in Table 3-2 show the concentrations of thorium-232 in the sediment samples. The concentrations in these samples ranged from 1.1 to 7.6 pCi/g. Use of the "less than" (<) notation indicates that the radionuclide was not present in measurable concentrations. The value following the less than notation is the minimum detectable amount (MDA). The MDA is based on various factors, including the volume, size, and weight of the sample; the type of detector used; the counting time, and the background count rate. In addition, since radioactive decay is a random process, a correlation between the rate of disintegration and a given radionuclide concentration cannot be precisely established. For this reason, the exact concentration of the radionuclide cannot be determined As such, each value that is equal to or greater than the MDA has an associated uncertainty term ($\pm$), which represents the maximum amount by which the actual value can be expected to differ from the value given in the table. The uncertainty term has an associated confidence level of 95 percent.

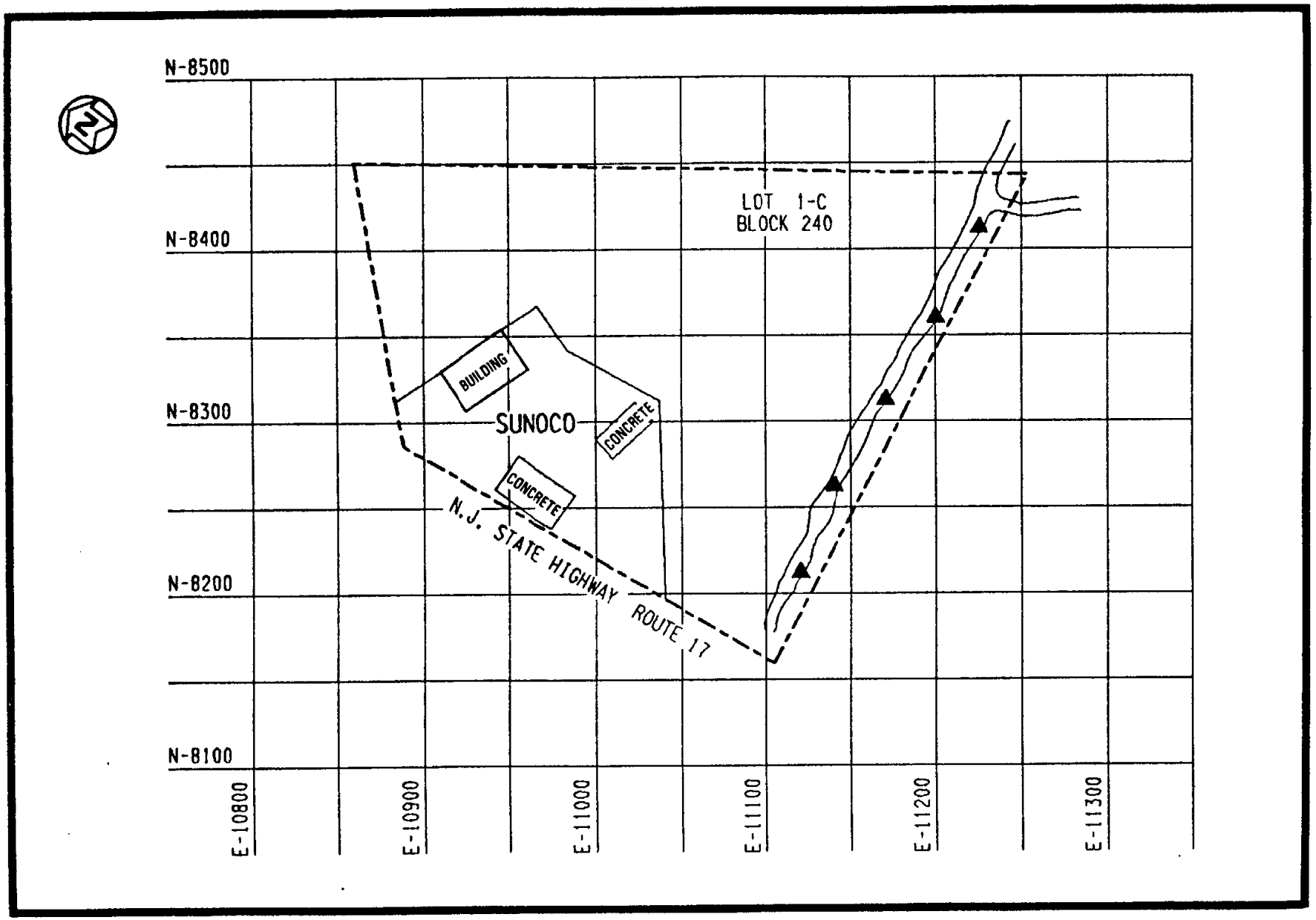

FIGURE 3-1 SEDIMENT SAMPLING LOCATIONS AT THE SUNOCO STATION PROPERTY

The maximum concentration for radium-226 was 2.0 pCi/g, which does not exceed the guideline for surface soil/sediments. No uranium-238 concentration above the laboratory MDA was identified.

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

Surface contamination was found in the drainage ditch along the southern boundary of the property (Figure 3-2). No surface contamination was found in other areas of the property. Approximately 80 percent of the property is covered by either asphalt or waste concrete (nearly 2 ft thick in some areas) which resulted in attenuation in readings of subsurface gamma-emitting contaminants during near-surface measurements.

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).

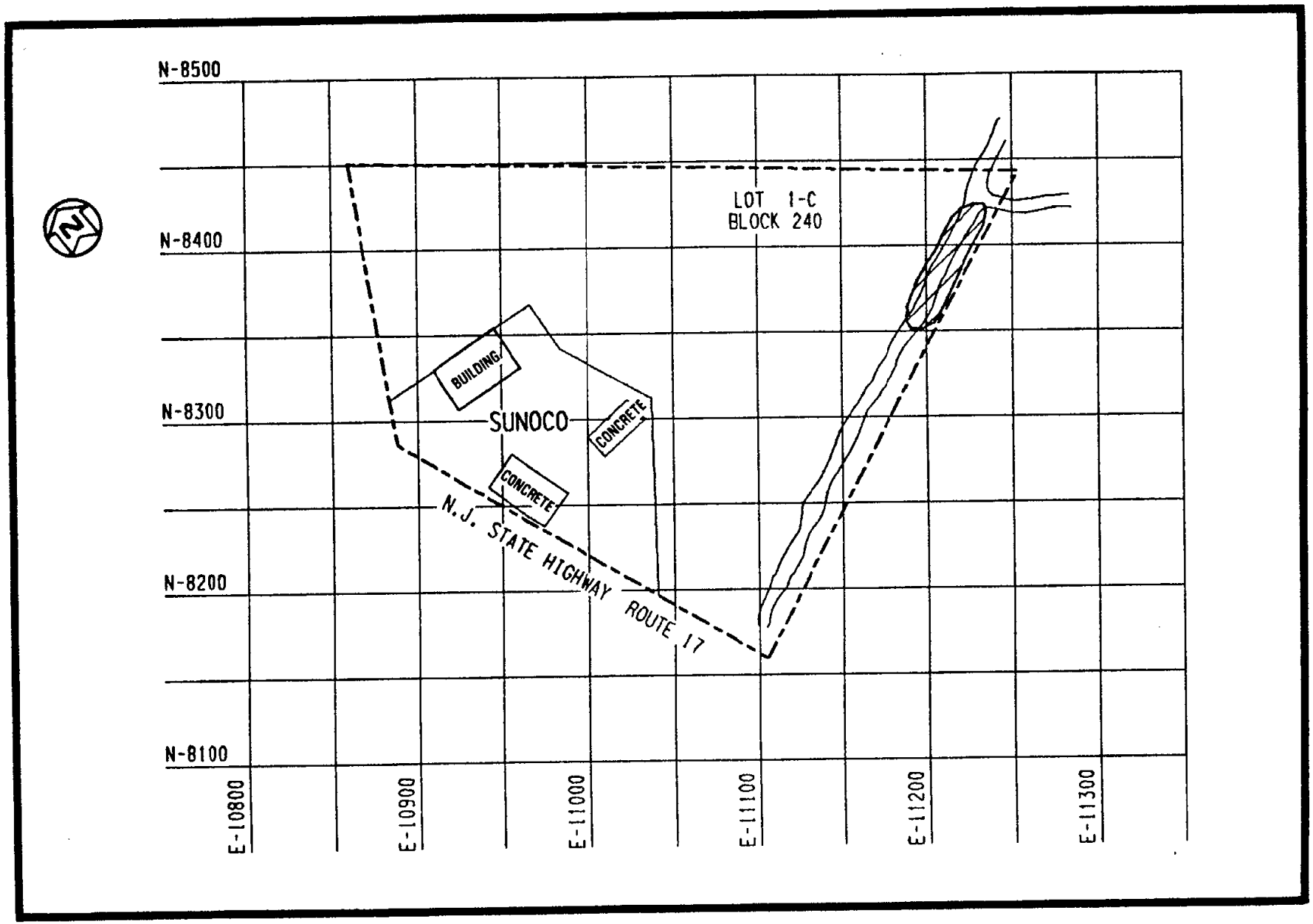

FIGURE 3-2 AREA OF SURFACE CONTAMINATION AT THE SUNOCO STATION PROPERTY

During the course of the subsurface investigation, eight radiological boreholes were drilled (Figure 3-3) and gamma logged to determine the depth of radioactive contamination. Detailed gamma logging data are presented in Table 3-3.

Subsurface contamination exists over approximately 80 to 90 percent of the property at depths varying from 1 to 5 ft (Figure 3-4). The primary source of this contamination is believed to be stream deposition from tailings ponds located upstream in the western drainage basin of the property to the north and east of the Sunoco property. Another probable source of contamination is fill emplacement during the development of the Sunoco property. Apparently, clean fill and contaminated soil were mechanically mixed during the development activities. Elevated readings below the water table at one sample location [Coordinates N8380, E11000 (Figure 3-3)] are believed to result from contaminated silt dropping to the bottom of the hole, thereby contaminating once clean, decomposed sandstone.

The borehole designation numbers can be related to the radiological data presented in Table 3-2 by use of the coordinates, so correlation of the radioactivity to specific types of material encountered in the boreholes will be possible. Such correlation may simplify visual identification of the materials to be removed if excavation is deemed necessary.

Geological information gained as a result of this characterization indicates that the topography of the Sunoco property is primarily flat with a total measured relief of 0.5 ft. The southern portion of the property contains gasoline tanks and natural gas and sewer lines covered by asphalt and concrete. Most of the property in the northern section is covered by 0.1 to 1.0 ft of concrete and is used as a parking area. The property is underlain by two types of soil, fill, and sandstone of the Brunswick Formation. Approximately 90 percent of the area was once a wetland environment characterized by a saturated, black organic silty soil on top of decomposed

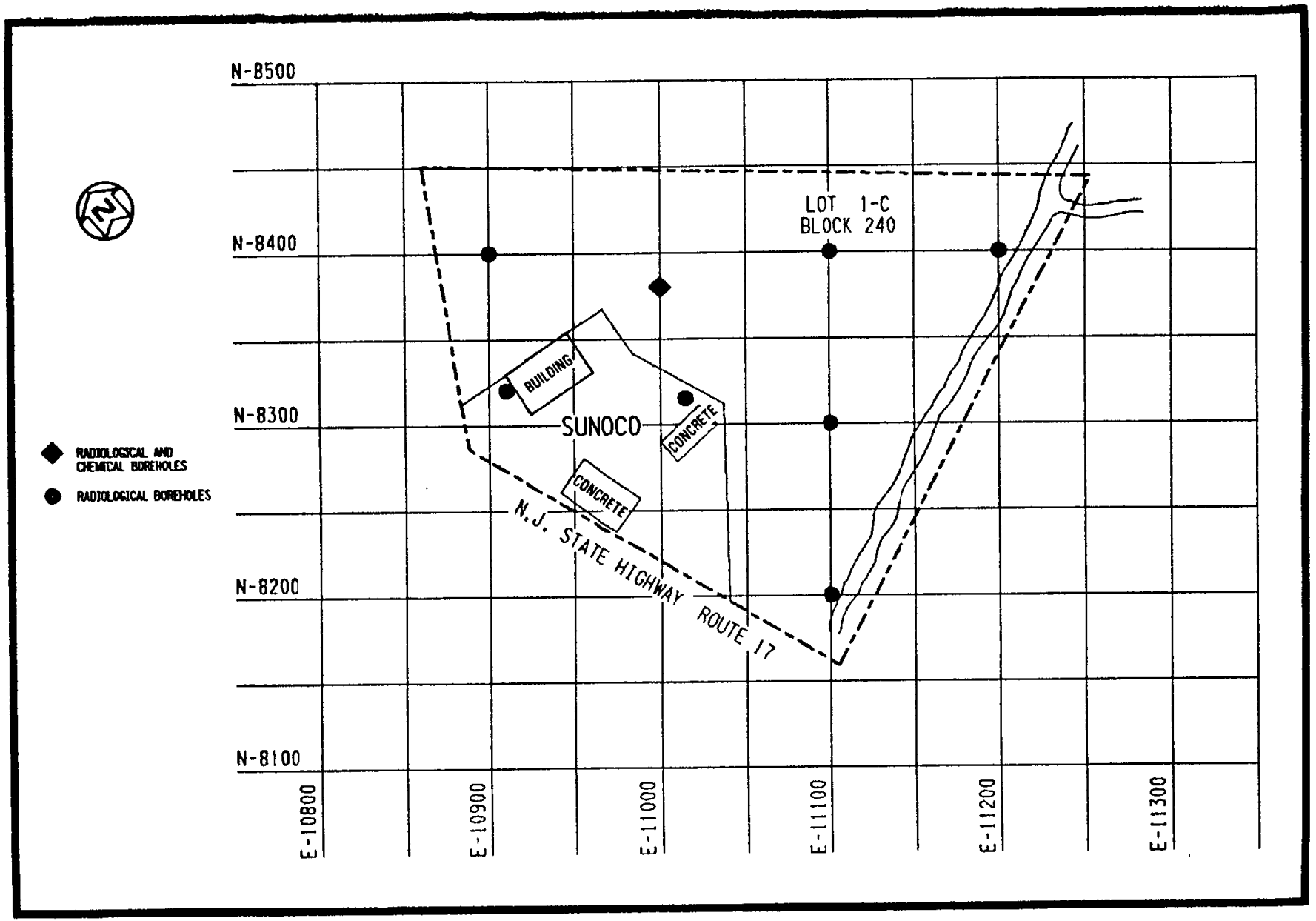

FIGURE 3-3 BOREHOLE LOCATIONS AT THE SUNOCO STATION PROPERTY

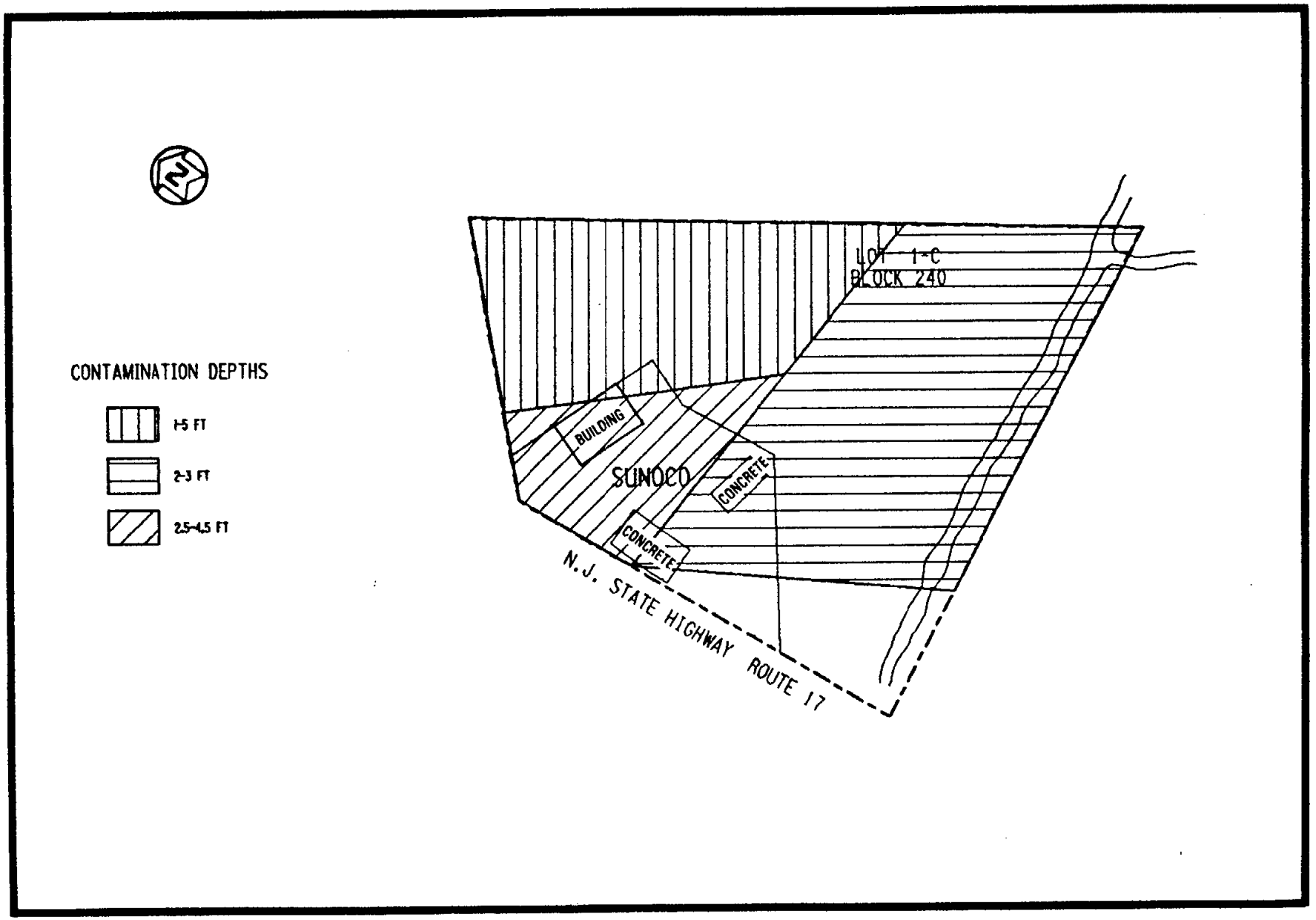

FIGURE 3-4 AREAS OF SUBSURFACE CONTAMINATION AT THE SUNOCO STATION PROPERTY

sandstone (dark yellowish brown grading to dark reddish brown at depth). At one location, a different sequence of a brown residual soil was found atop a Brunswick parent material. This soil marks former unsaturated higher ground between the converging Lodi Brook tributaries. During the development of the property, both soil sequences were covered by 1 to 6 ft of fill material. The fill is mostly disturbed residual soil, but reddish glacial alluvium may also be present.

A slight topographical depression marks the site's northwestern boundary. Underneath this depression is a buried conduit that drains the western section of the property immediately north and east of the Sunoco Station property. The depression acts as a sump for surface water, resulting in saturated soil conditions along this property line.

It appears, from the concave upper surface of the black organic silt lens, that the silt was mechanically moved from the center of the property to cover the northwestern conduit and create levees for the open southern drainage. This permitted a thicker sequence of sandy fill to be used as foundation subgrade material in the central portion of the property. At present, an open drainage ditch marks the southern boundary of the Sunoco Station property. The southern drainage ditch enters a conduit under Route 17. A drainage conduit has been buried along the northwestern property boundary and also extends under Route 17. Convergence of these two drainage conduits, into what is now known as Lodi Brook, occurs just west of Route 17. Drilling data indicate that these drain conduits are probably not in the original locations occupied by the Lodi Brook tributaries prior to development of the property. Location of the old streambeds is important in understanding the deposition history and in determining whether the old streambeds were used as dump sites for radioactive tailings and chemical-filled drums in the past.

TABLE 3-1

SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES FOR THE MAYWOOD SITE

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)

Radionuclide	Soil Concentration (pCi/g) above background[a,b,c]
Radium-226 Radium-228 Thorium-230 Thorium-232	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.
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.

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 μR/h.

Indoor/Outdoor Structure Surface Contamination

	Allowable Residual Surface Contamination[e] (dpm/100 cm^2)		
Radionuclide[f]	Average[g,h]	Maximum[h,i]	Removable[h,j]
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)

Indoor/Outdoor Structure Surface Contamination (continued)

Radionuclide[f]	Allowable Residual Surface Contamination[e] (dpm/100 cm^2) Average[g,h]	Maximum[h,i]	Removable[h,j]
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

[a]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.

[b]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^2 surface area.

[c]Localized concentrations in excess of these limits are allowable provided that the average concentration over a 100-m^2 area does not exceed these limits.

[d]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 1.3×10^5 MeV of potential alpha energy.

[e]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.

[f]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.

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

[h]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.

[i]The maximum contamination level applies to an area of not more than 100 cm^2.

[j]The amount of removable radioactive material per 100 cm^2 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^2 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

SEDIMENT SAMPLING RESULTS FOR THE SUNOCO STATION PROPERTY

Coordinates		Concentration (pCi/g +/- 2 sigma)		
East	North	Uranium-238	Radium-226	Thorium-232
11120	8212	<28.3	1.1 +/- 0.1	4.3 +/- 0.9
11140	8262	<14.7	0.7 +/- 0.1	1.1 +/- 0.1
11170	8312	<15.8	0.8 +/- 0.4	1.5 +/- 0.3
11200	8360	<13.0	1.5 +/- 0.2	6.8 +/- 0.5
11225	8412	<13.2	2.0 +/- 0.3	7.6 +/- 1.0

TABLE 3-3

DOWNHOLE GAMMA LOGGING RESULTS

FOR THE SUNOCO STATION PROPERTY

Coordinates East	Coordinates North	Depth (a) (ft)	Counts per Minute
10900	8400	0.5	26,000
10900	8400	1.0	42,000
10900	8400	1.5	48,000
10900	8400	2.0	66,000
10900	8400	2.5	117,000
10900	8400	3.0	242,000
10900	8400	3.5	284,000
10900	8400	4.0	151,000
10900	8400	4.5	66,000
10900	8400	5.0	30,000
10900	8400	5.5	16,000
10900	8400	6.0	13,000
10900	8400	6.5	10,000
10900	8400	7.0	10,000
10900	8400	7.5	9,000
10900	8400	8.0	10,000
10900	8400	8.5	9,000
10900	8400	9.0	8,000
10900	8400	9.5	8,000
10910	8320	0.5	13,000
10910	8320	1.0	15,000
10910	8320	1.5	15,000
10910	8320	2.0	15,000
10910	8320	2.5	30,000
10910	8320	3.0	61,000
10910	8320	3.5	86,000
10910	8320	4.0	84,000
10910	8320	4.5	41,000
10910	8320	5.0	16,000
10910	8320	5.5	101,000
10910	8320	6.0	10,000
10910	8320	6.5	10,000
10910	8320	7.0	10,000
10910	8320	7.5	12,000
10910	8320	8.0	11,000
10910	8320	8.5	11,000
10910	8320	9.0	10,000
11000	8380	0.5	19,000
11000	8380	1.0	24,000
11000	8380	1.5	34,000

TABLE 3-3

(continued)

Coordinates East	Coordinates North	Depth (a) (ft)	Counts per Minute
11000	8380	2.0	47,000
11000	8380	2.5	67,000
11000	8380	3.0	105,000
11000	8380	3.5	146,000
11000	8380	4.0	106,000
11000	8380	4.5	54,000
11000	8380	5.0	33,000
11000	8380	5.5	23,000
11000	8380	6.0	24,000
11000	8380	6.5	24,000
11000	8380	7.0	24,000
11015	8315	0.5	22,000
11015	8315	1.0	24,000
11015	8315	1.5	24,000
11015	8315	2.0	21,000
11015	8315	2.5	28,000
11015	8315	3.0	59,000
11015	8315	3.5	45,000
11015	8315	4.0	14,000
11015	8315	4.5	11,000
11015	8315	5.0	10,000
11015	8315	5.5	10,000
11015	8315	6.0	10,000
11015	8315	6.5	9,000
11015	8315	7.0	10,000
11015	8315	7.5	10,000
11100	8200	0.5	9,000
11100	8200	1.0	12,000
11100	8200	1.5	14,000
11100	8200	2.0	14,000
11100	8200	2.5	14,000
11100	8200	3.0	11,000
11100	8200	3.5	9,000
11100	8200	4.0	9,000
11100	8200	4.5	9,000
11100	8300	0.5	11,000
11100	8300	1.0	11,000
11100	8300	1.5	15,000
11100	8300	2.0	23,000

TABLE 3-3

(continued)

Page 3 of 4

Coordinates East	Coordinates North	Depth (a) (ft)	Counts per Minute
11100	8300	2.5	33,000
11100	8300	3.0	39,000
11100	8300	3.5	11,000
11100	8300	4.0	11,000
11100	8300	4.5	11,000
11100	8300	5.0	11,000
11100	8300	5.5	11,000
11100	8300	6.0	14,000
11100	8300	6.5	13,000
11100	8300	7.0	11,000
11100	8400	0.5	13,000
11100	8400	1.0	14,000
11100	8400	1.5	15,000
11100	8400	2.0	17,000
11100	8400	2.5	33,000
11100	8400	3.0	58,000
11100	8400	3.5	31,000
11100	8400	4.0	14,000
11100	8400	4.5	10,000
11100	8400	5.0	10,000
11100	8400	5.5	10,000
11100	8400	6.0	9,000
11100	8400	6.5	9,000
11100	8400	7.0	10,000
11100	8400	7.5	10,000
11100	8400	8.0	11,000
11200	8400	0.5	16,000
11200	8400	1.0	17,000
11200	8400	1.5	14,000
11200	8400	2.0	19,000
11200	8400	2.5	24,000
11200	8400	3.0	58,000
11200	8400	3.5	24,000
11200	8400	4.0	15,000
11200	8400	4.5	13,000
11200	8400	5.0	12,000
11200	8400	5.5	12,000
11200	8400	6.0	11,000
11200	8400	6.5	12,000
11200	8400	7.0	11,000

TABLE 3-3

(continued)

Coordinates East	Coordinates North	Depth (a) (ft)	Counts per Minute
11200	8400	7.5	12,000
11200	8400	8.0	11,000

(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.

4.0 CHEMICAL CHARACTERIZATION

Limited chemical characterization of the Sunoco Station property was performed to determine whether hazardous waste is mixed with the radioactive waste and to provide the information needed to design an employee health protection program appropriate to the nature of the materials encountered during future remedial action activities. To identify hazardous chemicals on-site, a soil sample was collected by continuous split-spoon methodology, i.e., driving a split-spoon sampler in advance of the auger at one borehole location [Coordinates N8380, E11000 (Figure 3-3)]. The spoon had a 1.4-in. inside diameter and was 2 ft long. Before the sample was taken, the samplers were decontaminated pursuant to EPA methods using methylene chloride, acetone, and steam washes. Split-spoon samplers were driven in 2-ft increments.

Since the purpose of this investigation was to perform a limited chemical characterization, the sample was composited to a maximum drillhole depth of 16 ft. The sample collection location is shown in Figure 3-3. A sample for VOA was placed on ice in the field to minimize volatilization of chemicals in the sample during compositing. The sample was analyzed for VOA, BNAE, priority pollutant metals, pesticides and PCBs, and EPA-specified hazardous waste characteristics [i.e., extraction procedure (EP) toxicity, corrosivity, reactivity, and ignitability]. These parameters were selected to provide a representative cross section of the hazardous constituents listed in the RCRA [40 CFR 261, Appendix VIII (Ref. 6)]. This characterization was planned and implemented in accordance with methods described by the EPA (Ref. 7). The sampling plan was reviewed by the EPA.

VOA indicated that methylene chloride was present in the sample, but the concentration was below the laboratory's detection limit. Because methylene chloride was used during field decontamination procedures and is a common chemical contaminant in laboratory operations, this result is probably an artifact (i.e., a false positive result) inherent in the sampling and analytical procedures.

Only a general evaluation of the data can be given as the holding time for the VOA was exceeded by the laboratory. According to the EPA Contractor Laboratory Program statement of work for organic analyses (May 1984), only analytical results greater than or equal to the laboratory's specified detection limit are required to be reported.

Analyses for BNAE (semi-volatiles) indicated that none were present in the sample. The sample was analyzed for priority pollutant pesticides and PCBs. No PCBs or pesticides were found in the sample.

The sample was analyzed for priority pollutant metals. These analysis results were compared to the range of concentrations present in soil samples typical of background soil concentration ranges for the specified priority pollutant metal.

The concentration of cadmium, a priority pollutant metal, was 2 ppm, which exceeds the range for background soil [0.01 to 0.7 ppm (Ref. 8)] and is also listed by the NJDEP as a hazardous constituent under New Jersey Administrative Code (NJAC) 7:26-8.16.

The maximum concentration observed for each priority pollutant metal was compared with the EP toxicity concentration for that metal. All of the EP toxicity concentrations were below the criteria level (40 CFR 261.24) (Ref. 9). This may be an indication that these metals are not readily leachable from the soil or are not present in concentrations high enough to produce leachate that exceeds the EPA criteria for hazardous waste according to EP toxicity characteristics. Trace levels of the metal barium were well below the maximum concentration specified under 40 CFR 261.24 (Ref. 9).

The sample was also analyzed for EP toxicity pesticides and as mentioned for the hazardous waste characteristics of corrosivity, reactivity, and ignitability. The EP toxicity analysis results indicated that no detectable quantities of pesticides were present. In addition, the sample exhibited no corrosivity, reactivity, or ignitability hazardous waste characteristics.

Complete results of the chemical characterization are on file with DOE (Ref. 10).

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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.

6. U.S. Code of Federal Regulations. 40 CFR 261, Appendix VIII, "Hazardous Constituents," Washington, DC, July 1986.

7. U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd edition, Washington, DC, 1982.

8. Braunstein, N. M. Ed. Health and Control Aspects of Coal Conversion, Ann Arbor Science, Ann Arbor, MI, 1981.

9. U.S. Code of Federal Regulations. 40 CFR 261.24, "Characteristic of EP Toxicity," Washington, DC, July 1986.

10. Memorandum, C.P. Leichtweis, Bechtel National, Inc., to T.M. Dravecky, Bechtel National, Inc. "Sears and Vicinity Property Characterization Results (Chemical Data)," CCN 042662, January 16, 1987.

APPENDIX A

GEOLOGIC DRILL LOGS FOR THE

MAYWOOD INTERIM STORAGE SITE - SUNOCO STATION

GEOLOGIC DRILL LOG

PROJECT: FUSRAP	JOB NO.: 14501-138	SHEET NO.: 1 OF 1	HOLE NO.: MISS-296R
SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION	COORDINATES: N8315,E11815	ANGLE FROM HORIZ.: 90°	BEARING: N/A
BEGUN: 8/7/86	COMPLETED: 8/7/86	DRILLER: MORETRENCH ENVIRONMENTAL SERVICES	DRILL MAKE AND MODEL: MOBILE B-33
HOLE SIZE: 6"	OVERBURDEN (FT.): 10.0	ROCK (FT.): 0.0	TOTAL DEPTH: 10.0'
CORE RECOVERY/FT./%: N/A	CORE BOXES: N/A	SAMPLES: N/A	EL. TOP OF CASING: N/A
GROUND EL.: 46.3'	DEPTH/EL. GROUND WATER: 4.5'/41.8'	DEPTH/EL. TOP OF ROCK: N/A	
SAMPLE HAMMER WEIGHT/FALL: N/A	CASING LEFT IN HOLE: DIA./LENGTH: N/A	LOGGED BY: D.McGRANE	

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS /6" PERCENT CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN GAL. PER FT.	WATER PRESSURE TESTS: PRESSURE P.S.I. PER FT.	WATER PRESSURE TESTS: TIME IN MINUTES PER FT.	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION*	REMARKS ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
							46.3	0				
AUGER, 6", THROUGHOUT.							46.2	0.1			0.0-0.1': CONCRETE. 0.1-10.0': SILTY SAND (SM-SC); COLOR STRATIFIED; FINE-TO MEDIUM-GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE) WITH NUMEROUS DENSE SILT AND CLAY LENSES; SLIGHTLY MOIST TO SATURATED AT 4.5 FT. 0.1-1.0': DARK YELLOWISH BROWN (10YR4/2). 1.0-3.5': MODERATE BROWN (5YR3/4) WITH A FEW GRAY (N5-6) CLAYEY LENSES. 3.5-5.0': ORGANIC LAYER; BLACK WITH A FEW PALE GREEN (5GY7/2) CLAYEY LENSES. 5.0-6.0': PALE GREEN; CLAYEY. 6.0-9.0': DARK YELLOWISH BROWN (10YR4/2); VERY SILTY. 9.0-10.0': DARK REDDISH BROWN (10R3/4); VERY SILTY; DECOMPOSED SANDSTONE. BOTTOM OF HOLE AT 10.0 FT. HOLE BACKFILLED WITH CEMENT-BENTONITE GROUT, 8/10/86.	▽ 8/10/86 SITE CHECKED FOR RADIOACTIVE CONTAMINATION, AND HOLE GAMMA LOGGED, BY EBERLINE ANALYTICAL CORPORATION.
							36.3	10				*DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.

B=SPLIT SPOON; ST=SHELBY TUBE; P=PISTON; O=OTHER

SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION

HOLE NO.: MISS-296R

GEOLOGIC DRILL LOG

PROJECT: FUSRAP	JOB NO.: 14501-138	SHEET NO.: 1 OF 1	HOLE NO.: MISS-297R
SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION	COORDINATES: N8300,E12000	ANGLE FROM HORIZ.: 90°	BEARING: N/A

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
8/7/86	8/7/86	MORE TRENCH ENVIRONMENTAL SERVICES	MOBILE B-33	6"	6.5'	2.5'	9.0'

CORE RECOVERY/FT./%D	CORE BARREL	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
N/A	N/A	N/A	N/A	46.3'	4.0'/42.3'	6.5'/39.8'

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY
N/A	N/A	D. McGRANE

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY/ CORE RECOVERY	SAMPLE % ORE & PERCENT CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN GPM	WATER PRESSURE TESTS: PRESSURE PSI	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION *	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
AUGER, 6", THROUGHOUT,							46.3	0				
							46.2	0.1			0.0-0.1': CONCRETE.	
								5			0.1-6.5': SILTY SAND (SM) 5YR3/4 COLOR STRATIFIED SOIL HORIZONS; FINE-TO MEDIUM-GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE) WITH A FEW DENSER CLAYEY ZONES (3.0-4.0 FT); SLIGHTLY MOIST TO SATURATED AT 4.0 FT. 0.1-3.0': MODERATE BROWN (5YR3/4); FEW ROUNDED PEBBLES; FEW ORGANICS. 3.0-4.0': ORGANIC LAYER; BLACK WITH A FEW PALE GREEN (5G7/2) CLAYEY LENSES. 4.0-5.0': PALE GREEN. 5.0-6.5': DARK YELLOWISH BROWN (10YR4/2); VERY SILTY.	▽ 8/10/86 SITE CHECKED FOR RADIOACTIVE CONTAMINATION AND HOLE GAMMA LOGGED BY EBERLINE ANALYTICAL CORPORATION.
							39.8	6.5				
							37.3	9.0			6.5-9.0': DECOMPOSED SANDSTONE; DARK REDDISH BROWN (10R3/4); FINE-GRAINED (ARGILLACEOUS); SOFT TO MODERATELY HARD; POORLY TO WELL CEMENTED; TOTALLY DECOMPOSED TO HIGHLY WEATHERED; AUGER SPOILS CONSIST OF SILTY SAND (SM) AND GRAVEL; SATURATED.	
											BOTTOM OF HOLE AT 9.0 FT. HOLE BACKFILLED WITH CEMENT-BENTONITE GROUT, 8/10/86.	REFUSAL AT 9.0 FT.

* DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.

SS-SPLIT SPOON; ST-SHELBY TUBE; P-PISTON; O-OTHER

SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION

HOLE NO.: MISS-297R

GEOLOGIC DRILL LOG

PROJECT: FUSRAP	JOB NO.: 14501-138	SHEET NO.: 1 OF 1	HOLE NO.: MISS-299R
SITE: MAYWOOD INTERIM STORAGE SITE- SUNOCO STATION	COORDINATES: N8200,E11100	ANGLE FROM HORIZ.: 90°	BEARING: N/A

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
8/8/86	8/8/86	MORETRENCH ENVIRONMENTAL SERVICES	MOBILE B-33	6"	5.0'	0.0	5.0'

CORE RECOVERY/FT./%	CORE BARREL	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
N/A	N/A	N/A	N/A	46.2'	NONE OBSERVED	N/A

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE; DIA./LENGTH	LOGGED BY:
N/A	N/A	D.McCRANE

SAMPLE TYPE AND DIAMETER	SAMPLED INTERVAL/ LENGTH CORE RUN	SAMPLE RECOVERY/ CORE RECOVERY	SAMPLE BLOWS OR PERCENT CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN GPM/FT	WATER PRESSURE TESTS: PRESSURE PSI	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION*	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
AUGER, 6", THROUGHOUT.							46.2	0			0.0-3.5'; SANDY SILT (ML); MODERATE BROWN (5YR3/4); FINE-GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE); MOIST.	SITE CHECKED FOR RADIOACTIVE CONTAMINATION, AND HOLE GAMMA LOGGED, BY EBERLINE ANALYTICAL CORPORATION.
								3.5			3.5-5.0'; SILTY SAND (SM-SC); DARK YELLOWISH BROWN (10YR4/2) WITH A FEW LENSES OF PALE GREEN (5G7/2) SILT AND NUMEROUS PIECES OF DARK REDDISH BROWN (10R3/4) SANDSTONE; FINE-TO MEDIUM-GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE); MOIST.	
							41.2	5			BOTTOM OF HOLE AT 5.0 FT.	*DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.
											HOLE WAS IMMEDIATELY BACKFILLED WITH THE AUGER SPOILS.	

SS-SPLIT SPOON; ST-SHELBY TUBE; P-PISTON; O-OTHER

SITE: MAYWOOD INTERIM STORAGE SITE- SUNOCO STATION

HOLE NO.: MISS-299R

GEOLOGIC DRILL LOG

PROJECT: FUSRAP	JOB NO.: 14501-138	SHEET NO.: 1 OF 1	HOLE NO.: MISS-300R		
SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION	COORDINATES: N8400,E11200	ANGLE FROM HORIZ.: 90°	BEARING: N/A		
BEGUN: 8/8/86	COMPLETED: 8/8/86	DRILLER: NORETRENCH ENVIRONMENTAL SERVICES	DRILL MAKE AND MODEL: MOBILE B-33	HOLE SIZE: 6"	OVERBURDEN (FT.): 10.0'
ROCK (FT.): 0.0	TOTAL DEPTH: 10.0'				
CORE RECOVERY(FT.)/%: N/A	CORE BARREL: N/A	SAMPLES: N/A	EL. TOP OF CASING: N/A	GROUND EL.: 46.5	DEPTH/EL. GROUND WATER: 4.5'/42.0'
DEPTH/EL. TOP OF ROCK: N/A					
SAMPLE HAMMER WEIGHT/FALL: N/A	CASING LEFT IN HOLE: DIA./LENGTH: N/A	LOGGED BY: D.McGRANE			

SAMPLE TYPE AND CHARACTER	SAMPLER ADVANCE/LENGTH CORE RUN	SAMPLE RECOVERY/CORE RECOVERY	SAMPLE BLOWS / % PERCENT CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN GPM; PRESSURE PSI; TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION*	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					46.5	0				
AUGER, 6", THROUGHOUT.					45.9	0.6			0.0-0.6': CONCRETE. 0.6-5.0': SANDY SILT (ML); BLACK; FINE GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE); NUMEROUS ORGANICS (POSSIBLE REDUCING ENVIRONMENT); MOIST TO SATURATED AT 4.5 FT.	▽ 8/10/86 SITE CHECKED FOR RADIOACTIVE CONTAMINATION, AND HOLE GAMMA LOGGED, BY EBERLINE ANALYTICAL CORPORATION.
					41.5	5			5.0-10.0': SILTY SAND (SM-SC); MOTTLED DARK REDDISH BROWN (10R3/4) AND DARK YELLOWISH BROWN (10YR4/2); FINE-TO MEDIUM-GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE); CLAYEY; SATURATED.	
					36.5	10			BOTTOM OF HOLE AT 10.0 FT. HOLE BACKFILLED WITH CEMENT-BENTONITE GROUT, 8/10/86.	*DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.

SS-SPLIT SPOON ST-SHELBY TUBE; P-PISTON O-OTHER

SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION

HOLE NO.: MISS-300R

GEOLOGIC DRILL LOG

PROJECT: FUSRAP	JOB NO.: 14501-138	SHEET NO.: 1 OF 1	HOLE NO.: MISS-329C		
SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION	COORDINATES: N8380,E11080	ANGLE FROM HORIZ.: 90°	BEARING: N/A		
BEGUN: 8/29/86	COMPLETED: 8/29/86	DRILLER: MORETRENCH ENVIRONMENTAL SERVICES	DRILL MAKE AND MODEL: MOBILE B-33	HOLE SIZE: 8"	OVERBURDEN (FT.): 9.0'	ROCK (FT.): 1.0'	TOTAL DEPTH: 10.0'
CORE RECOVERY/FT./%: N/A	CORE BOXES: N/A	SAMPLES: 2	EL. TOP OF CASING: N/A	GROUND EL.: 46.3'	DEPTH/EL. GROUND WATER: 5.0'/41.3'	DEPTH/EL. TOP OF ROCK: 9.0'/37.3'	
SAMPLE HAMMER WEIGHT/FALL: N/A	CASING LEFT IN HOLE: DIA./LENGTH: N/A	LOGGED BY: P.YEH					

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE, LENGTH CORE RUN	SAMPLE RECOVERY, CORE RECOVERY	SAMPLE BLOWS per PERCENT CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN GPM PER FT.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
							46.4	0				
											0.0-1.0': ASPHALT AND CRUSHED ROCK; PAVEMENT AND ROAD BASE.	SITE CHECKED FOR RADIOACTIVE CONTAMINATION BY EBERLINE ANALYTICAL CORPORATION.
SS G	24"	N/A	N/A				45.3	1.0		1	1.0-4.0': SILT (ML); MODERATE BROWN (5YR3/4), SANDY, WITH WOOD FRAGMENTS, PIECES OF STEEL SHEET METAL AT 4.0 FT, PIECES OF COPPER WIRE.	
							42.3	4.0			4.0-9.0': SAND (SC-SM); FINE-GRAINED, SILTY, MOIST.	▽ 9/5/86
SS G	12"	N/A	N/A					5		2	4.0-5.0': DUSKY BROWN (5YR2/2). 5.0-9.0': BROWNISH GRAY (5YR3/1).	EBERLINE ANALYTICAL CORPORATION PERFORMED GAMMA LOGGING.
							37.3	9.0			9.0-10.0': SANDSTONE: DUSKY RED (5R3/4), FINE-GRAINED, SILTY, WEATHERED, SOFT.	
							36.3	10			BOTTOM OF HOLE AT 10.0 FT. HOLE BACKFILLED WITH CEMENT-BENTONITE GROUT, 9/5/86.	ADVANCED HOLE WITH HOLLOW STEM AUGER (4x8 INCH).
								15				
								20				
								25				
								30				
								35				* DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.

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

SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION

HOLE NO.: MISS-329C

046676

GEOLOGIC DRILL LOG

PROJECT: FUSRAP	JOB NO.: 14501-138	SHEET NO.: 1 OF 1	HOLE NO.: MISS-401R
SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION	COORDINATES: N8400,E10900	ANGLE FROM HORIZ.: 90°	BEARING: N/A

STARTED	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
8/8/86	8/8/86	MORETRENCH ENVIRONMENTAL SERVICES	MOBILE B-33	6"	10.0'	0.0'	10.0'

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	46.3'	6.5'/39.8'	N/A

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
N/A	N/A	D McGRANE

SAMPLE TYPE AND DIAMETER	SAMPLE ADVANCE: LENGTH CORE RUN	SAMPLE RECOVERY: CORE RECOVERY	SAMPLE BLOWS "N" PERCENT CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
6" AUGER THROUGHOUT.							46.3	0				
							45.9	0.4			0.0-0.4': ASPHALT. 0.4-10.0': SILTY SAND (SM-SC); COLOR STRATIFIED; FINE-TO MEDIUM-GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE) WITH ONE DENSER CLAYEY ZONE (5.0-5.5 FT); MOIST TO SATURATED AT 6.5 FT. 0.4-5.0': GRAYISH BLACK (N2); NUMEROUS GRASS ROOTS (0.4-1.0 FT) AND ORGANICS. 5.0-5.5': CLAYEY ZONE; ALTERNATING 0.25" LENSES OF DUSKY YELLOW (5Y6/4) AND PALE GREEN (5G7/2). 5.5-7.0': DARK YELLOWISH BROWN (10YR4/2). 7.0-10.0': DARK REDDISH BROWN (10R3/4); DECOMPOSED SANDSTONE.	SITE CHECKED FOR RADIOACTIVE CONTAMINATION AND HOLE GAMMA LOGGED BY EBERLINE ANALYTICAL CORPORATION. 8/8/86.
								5				
								10				
							35.9				BOTTOM OF HOLE AT 10.0 FT. AUGER SPOILS WERE IMMEDIATELY REPLACED IN THE HOLE.	
								15				
								20				
								25				
								30				
								35				

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

SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION

HOLE NO.: MISS-401R

• DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.

GEOLOGIC DRILL LOG

PROJECT: FUSRAP	JOB NO.: 14501-138	SHEET NO.: 1 OF 1	HOLE NO.: MISS-402R		
SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION	COORDINATES: N8320,E10910	ANGLE FROM HORIZ.: 90°	BEARING: N/A		
BEGUN: 8/8/86	COMPLETED: 8/8/86	DRILLER: MORETRENCH ENVIRONMENTAL SERVICES	DRILL MAKE AND MODEL: MOBILE B-33	HOLE SIZE: 6"	OVERBURDEN (FT.): 10.0'
ROCK (FT.): 0.0	TOTAL DEPTH: 10.0'				
CORE RECOVERY FT./%: N/A	CORE BOXES: N/A	SAMPLES: N/A	EL. TOP OF CASING: N/A	GROUND EL.: 46.3'	DEPTH/EL. GROUND WATER: 6.5'/39.8'
DEPTH/EL. TOP OF ROCK: N/A					
SAMPLE HAMMER WEIGHT/FALL: N/A	CASING LEFT IN HOLE: DIA./LENGTH: N/A	LOGGED BY: D McGRANE			

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS /6" PERCENT CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN GPM; PRESSURE PSI; TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION •	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
6" AUGER THROUGHOUT.					46.3	0				
					46.0	0.3			0.0-0.3': ASPHALT. 0.3-10.0': SILTY SAND (SM) SOIL COLOR STRATIFIED; FINE-TO MEDIUM-GRAINED; SOFT; POORLY CONSOLIDATED (LOOSE) WITH A FEW DENSER CLAYEY ZONES (1.5-5.0 FT); MOIST TO SATURATED AT 6.5 FT. 0.3-1.5': DARK YELLOWISH BROWN (10YR4/2). 1.5-5.0': GRAYISH BLACK (N2) WITH A FEW GRAY (N6) CLAYEY LENSES; NUMEROUS WOOD CHIPS AND ORGANICS. 5.0-10.0': DARK YELLOWISH BROWN; CLAYEY.	SITE CHECKED FOR RADIOACTIVE CONTAMINATION AND HOLE GAMMA LOGGED BY EBERLINE ANALYTICAL CORPORATION. ▽ 8/8/86.
						5				
					36.3	10			BOTTOM OF HOLE AT 10.0 FT. HOLE BACKFILLED WITH CEMENT-BENTONITE GROUT, 8/10/86.	

• DESCRIPTION AND CLASSIFICATION BY VISUAL EXAMINATION OF CUTTINGS.

SS-SPLIT SPOON; ST-SHELBY TUBE; P-PISTON; O-OTHER

SITE: MAYWOOD INTERIM STORAGE SITE-SUNOCO STATION

HOLE NO.: MISS-402R