				• .
-				09
	~ 1			
	- I I	1 10	-	1 12 14
$\mathcal{O}\mathcal{O}$		1 W	_	
-				

DOE/OR/20722-168

M-038

Formerly Utilized Sites Remedial Action Program (FUSRAP) Contract No. DE-AC05-810R20722

RADIOLOGICAL CHARACTERIZATION REPORT FOR THE RESIDENTIAL PROPERTY AT 11 BRANCA COURT

Lodi, New Jersey

November 1988



Bechtel National, Inc.

1. 444 ...

Bechtel National, Inc.

Systems Engineers — Constructors

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

Mail Address P.O. Box 3(1), Oak Ridge, TN 37831-0313. Talex: 3785873

NOV 1 : MBH

U.S. Department of Energy Oak Ridge Operations Post Office Box 2001 Oak Ridge, Tennessee 37831-8723

Attention: Peter J. Gross, Director Technical Services Division

150 2

- 1 - Mar. -

• • • •

- Subject: Bechtel Job No. 14501, FUSRAP Project DOE Contract No. DE-AC05-810R20722 Publication of the Radiological Characterization Reports for the Residential Properties at 7 Branca Court, 11 Branca Court, 16 Long Valley Road, 18 Long Valley Road, 20 Long Valley Road, 22 Long Valley Road, 26 Long Valley Road, 11 Redstone Lane, and the Lodi Municipal Park, in Lodi, New Jersey Code: 7310/WBS: 138
- Reference: Letter from S. K. Oldham (DOE), 88-669 dated October 19, 1988, to B. W. Clemens (BNI), "Final Comments on the Prepublication Draft of the Radiological Characterization Reports for the Pesidential Properties at 7 Branca Court, 11 Branca Court, 16 Long Valley Road, 18 Long Valley Road, 20 Long Valley Road, 22 Long Valley Road, 26 Long Valley Road, 11 Redstone Lane, and the Lodi Municipal Park, in Lodi, New Jersey," CCN 056527.

Dear Mr. Gross:

Enclosed are six copies each of the published version of the nine characterization reports listed above. Incorporated in these reports are comments based on the reference above and additional discussions between N. C. Ring and S. K. Oldham of your office and J. D. Berger of ORAU.



「日本語」です

Peter J. Gross

2

These publications also incorporate changes in wording regarding site release as requested by S. K. Oldham and A. Avel.

Please notify me should you require additional copies (6-1677).

Very truly yours, 10000 B. W. Clemens for Project Manager - FUSRAP CONCURRENCE

ĐZ

SKL

BWC/sk1:1750x Enclosures: As stated

cc:

J. D. Berger, ORAU (w/all enclosures) G. K. Hovey, w/o

R. G. Atkin, w/o

B. A. Hughlett, w/o

M. R. McDougall, TMA/E (w/all enclosures)

S. K. Oldham, w/o

R. Rosen, EPA Region II, W/O

R. E. Swaja, ORNL, W/O

J. F. Wing, w/o

RADIOLOGICAL CHARACTERIZATION REPORT FOR THE RESIDENTIAL PROPERTY AT 11 BRANCA COURT LODI, NEW JERSEY

NOVEMBER 1988

Prepared for

UNITED STATES DEPARTMENT OF ENERGY OAK RIDGE OPERATIONS OFFICE Under Contract No. DE-AC05-810R20722

By

.

N. C. Ring and S. K. Livesay Bechtel National, Inc. Oak Ridge, Tennessee

Bechtel Job No. 14501

TABLE OF CONTENTS

			<u>Page</u>
Abbr	eviat	ions	v
1.0	Intr	oduction and Summary	1
	1.1	Introduction	1
	1.2	Purpose	1
	1.3	Summary	3
2.0	Site	History	6
	2.1	Previous Radiological Surveys	7
	2.2	Remedial Action Guidelines	7
3.0	Heal	th and Safety Plan	11
	3.1	Subcontractor Training	11
	3.2	Safety Requirements	11
 4.0	Chara	acterization Procedures	13
	4.1	Field Radiological Characterization	13
		4.1.1 Measurements Taken and Methods Used	13
		4.1.2 Sample Collection and Analysis	14
	4.2	Building Radiological Characterization	17
5.0	Chara	acterization Results	19
	5.1	Field Radiological Characterization	19
	5.2	Building Radiological Characterization	20
Refe	rence	8	32
Appe	ndix 2	A - Geologic Drill Logs for ll Branca Court	A -1

iii

LIST OF FIGURES

Figure	Title	Page
1-1	Location of Lodi Vicinity Properties	2
1-2	Location of 11 Branca Court	4
4-1	Borehole Locations at 11 Branca Court	15
4-2	Surface and Subsurface Soil Sampling Locations at 11 Branca Court	16
5-1	Areas of Surface Contamination at 11 Branca Court	21
5-2	Areas of Subsurface Contamination at ll Branca Court	22

LIST OF TABLES

Table	Title	Page
2-1	Summary of Residual Contamination Guidelines for the Lodi Vicinity Properties	9
5-1	Surface and Subsurface Radionuclide Concentrations in Soil for 11 Branca Court	24
5-2	Downhole Gamma Logging Results for 11 Branca Court	26

ABBREVIATIONS

cm	centimeter
cm ²	square centimeter
cpm	counts per minute
dpm	disintegrations per minute
ft	foot
h	hour
in.	inch
1	liter
l/min	liters per minute
m	meter
m ²	square meter
MeV	million electron volts
µR/h	microroentgens per hour
mi	mile
mi ²	square mile
min	minute
mrad/h	millirad per hour
mrem	millirem
mrem/yr	millirem per year
pCi/g	picocuries per gram
pCi/l	picocuries per liter
WL	working level
Ъд	yard
yd ³	cubic yards

v

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 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 residential properties in Lodi, New Jersey, are included in FUSRAP as vicinity properties. Figure 1-1 shows the location of the Lodi vicinity properties in relation to the former Maywood Chemical Works.

The United States 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 DOE Oak Ridge Operations. As the Project Management Contractor for FUSRAP, Bechtel National, Inc. (BNI) is responsible to DOE for planning, managing, and implementing FUSRAP.

1.2 <u>PURPOSE</u>

The purpose of the 1986 survey performed by BNI was to locate the horizontal and vertical boundaries of radionuclide concentrations exceeding remedial action guidelines.

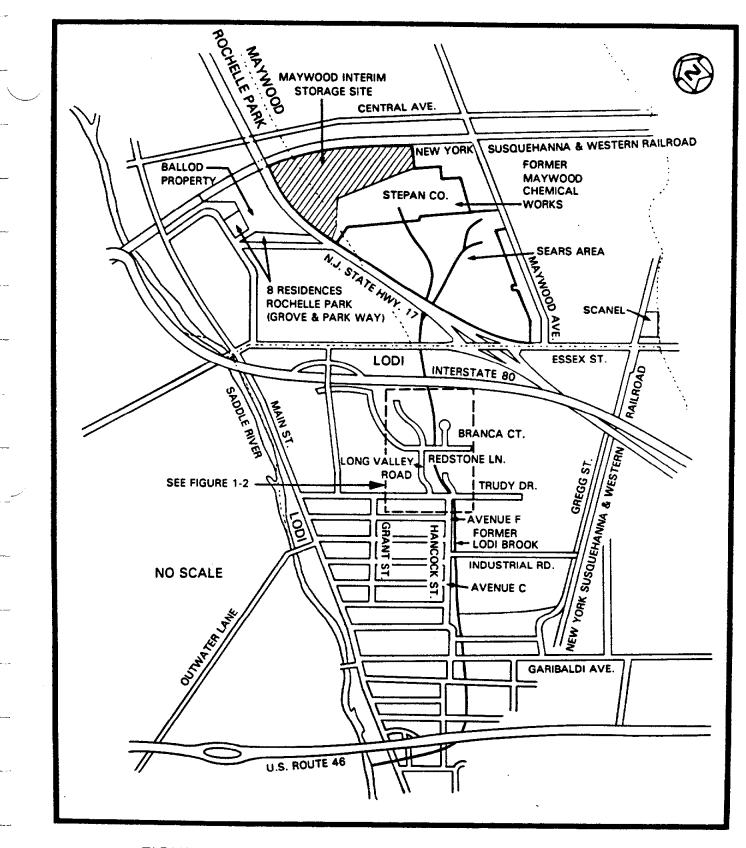


FIGURE 1-1 LOCATION OF LODI VICINITY PROPERTIES

1.3 SUMMARY

This report summarizes the procedures and results of the radiological characterization of the property at 11 Branca Court (Figure 1-2) in Lodi, New Jersey, conducted from September through December 1986.

Ultimately, the data generated during the radiological characterization will be used to define the complete scope of remedial action necessary to release the site.

This characterization confirmed that thorium-232 is the primary radioactive contaminant at this property. Results of surface soil samples for 11 Branca Court showed maximum concentrations of thorium-232 and radium-226 to be 11.3 and 2.0 pCi/g, respectively. Subsurface soil sample concentrations ranged from 1.0 to 9.4 pCi/g for thorium-232 and from 0.5 to 2.0 pCi/g for radium-226. The average background level in this area for both radium-226 and thorium-232 is 1.0 pCi/g.

Historical information indicates that uranium is not a primary contaminant in this area; therefore, analysis for uranium was not considered critical for this characterization. The soil samples have been archived and, if necessary, can be analyzed for uranium at some future date. Because the major contaminants at the vicinity properties are thorium and radium, the decontamination guidelines provide the appropriate guidance for the cleanup activities. DOE believes that these guidelines are conservatively low for considering potential adverse health effects that might occur in the future from any residual contamination. The dose contributions from uranium and any other radionuclides not numerically specified in these guidelines are not expected to be significant following decontamination. In addition, because the vicinity properties will be decontaminated in a manner to reduce future doses to levels that are as low as reasonably achievable (ALARA), DOE will ensure that most of the radioactivity present at these vicinity properties will be removed during the cleanup (Ref. 2).

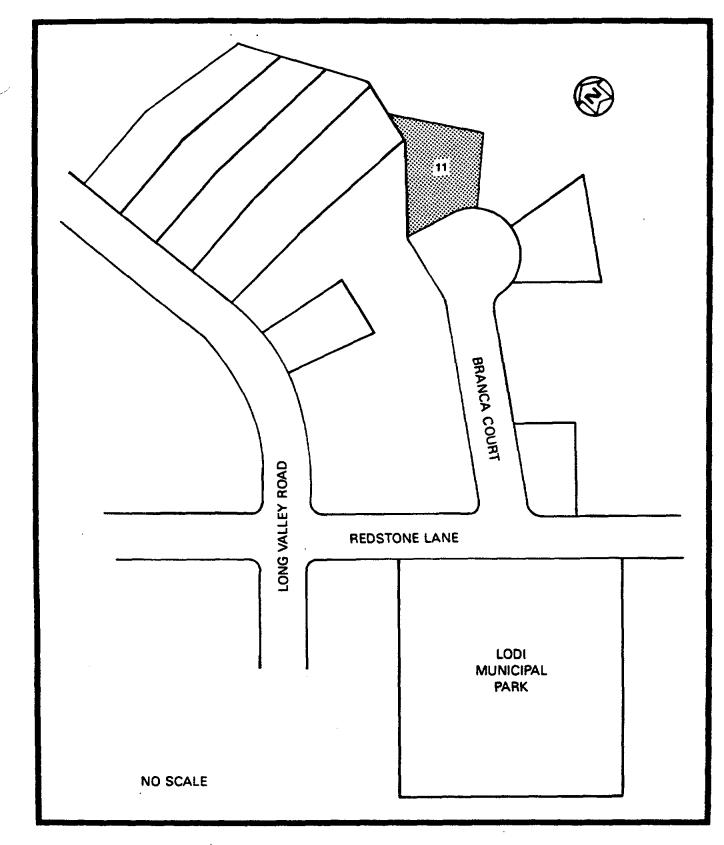


FIGURE 1-2 LOCATION OF 11 BRANCA COURT

Soil analysis data for this property showed surface contamination. Subsurface investigation by gamma logging indicated contamination to a depth of 8.5 ft.

The radon-222 measurements inside the residence indicated a concentration less than 0.8 pCi/l, which is within the DOE guideline of 3.0 pCi/l.

Measurements for radon daughters ranged from 0.003 to 0.004 WL. Measurements were made for thoron daughters; however, results were negligible.

2.0 SITE HISTORY

The Maywood Chemical Works was founded in 1895. During World War I (in 1916), the company began processing thorium from monazite sand for use in manufacturing gas mantles for various lighting devices. The company continued this work until 1956. Process wastes from manufacturing operations were pumped to two areas surrounded by earthen dikes (northern and southern diked areas) on property west of the plant. Subsequently, some of the contaminated wastes migrated onto adjacent and vicinity properties.

In 1928 and again between 1944 and 1946, some of the residues from the processing operations were moved from the company's property and used as mulch and fill in nearby low-lying areas. The fill material consisted of tea and cocoa leaves mixed with other material resulting from operations at the plant and apparently also contained thorium process wastes (Ref. 3).

It is not known for certain how the properties in Lodi were contaminated. According to an area resident, fill from an unknown source was brought to Lodi and spread over large portions of the previously low-lying and swampy area. For several reasons, however, a more plausible explanation is that the contamination migrated along a drainage ditch originating on the Maywood Chemical Works property. It can be seen from photographs and tax maps of the area that the course of a previously existing stream known as Lodi Brook, which originated at the former Maywood Chemical Works, generally coincides with the path of contamination in Lodi. The brook was subsequently replaced by a storm drain system as the area was Secondly, samples taken from Lodi properties indicate developed. elevated concentrations of a series of elements known as rare earths. Rare earth elements are typically found in monazite sands, which also include thorium. This type of sand was feedstock at the Maywood Chemical Works, and elevated levels are known to exist in the by-product of the extraction process. Third, the ratio of thorium to other radionuclides found in these Lodi properties is .

comparable to the ratio found in contaminated material on other properties in Lodi (Ref. 4). And finally, long-time residents of Lodi recall chemical odors in and around the brook in Lodi and steam rising off the water. These observations suggest discharges of contaminants occurring upstream.

The Stepan Chemical Company (now called the Stepan Company) purchased Maywood Chemical Works in 1959. The Stepan Company itself has never been involved in the manufacture or processing of any radioactive materials (Ref. 5).

2.1 PREVIOUS RADIOLOGICAL SURVEYS

<u>January 1981</u> - The Nuclear Regulatory Commission (NRC) directed that a survey of the Stepan Company property and its vicinity be conducted. Using the Stepan Company plant as the center, a 4-mi² aerial survey conducted by the EG&G Energy Measurements Group identified anomalous concentrations of thorium-232 to the north and south of the Stepan Company property. The Lodi residential properties were included in this survey (Ref. 6).

<u>June 1984</u> - In June 1984, Oak Ridge National Laboratory (ORNL) conducted a "drive by" survey of Lodi using its "scanning van." Although not comprehensive, the survey indicated areas requiring further investigation (Ref. 7).

<u>September 1986</u> - At the request of DOE, ORNL conducted radiological surveys of the vicinity properties in Lodi, New Jersey, for the purpose of determining which properties contained radioactive contamination in excess of guidelines and would require remedial action (Ref. 8).

2.2 <u>REMEDIAL ACTION GUIDELINES</u>

Table 2-1 summarizes the DOE guidelines for residual contamination. The thorium-232 and radium-226 limits listed in Table 2-1 will be

used to determine the extent of remedial action required at the vicinity properties. DOE developed these guidelines to be consistent with the guidelines established by the Environmental Protection Agency (EPA) for the Uranium Mill Tailings Remedial Action Program.

TABLE 2-1

SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES FOR THE LODI VICINITY PROPERTIES

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 ALLOWABLE LIMITS)

<u>Radionuclide</u>

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-cmthick soil layer below the surface layer.

STRUCTURE GUIDELINES (MAXIMUM ALLOWABLE LIMITS)

Airborne Radon Decay Products

Generic guidelines for concentrations of airborne radon decay products shall apply to existing occupied or habitable structures on private property; 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 shall not exceed the background level by more than 20 μ R/h.

Indoor/Outdoor Structure Surface Contamination

	Allowable Residual Surface Contamination ^e (dpm/100 cm ²)		
Radionuclide	<u>Average</u> g,h	<u>Maximum</u> h,i	<u>Removable</u> h,j
Transuranics, Ra-226, Ra-228, Th-230, Th-228 Pa-231, Ac-227, 1-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224 U-232, 1-126, I-131, I-133	1,000	3,000	200

TABLE	2-1

Page 2 of 2

	Allowable Re	sidual Surface Co (dpm/100 cm ²)	••••••	
Radionuclide ^f	<u>Average</u> g,h <u>Maximum</u> h,		i <u>Removable</u> h,j	
U-Natural, U-235, U-238, and associated decay products	5,000 a	15,000 a	1,000 œ	
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	

^aThese 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.

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

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

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

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

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

⁹Measurements 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.

^hThe 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.

¹The maximum contamination level applies to an area of not more than 100 cm^2 .

jThe amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, 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 cm² is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. The numbers in this column are maximum amounts.

3.0 HEALTH AND SAFETY PLAN

BNI is responsible for protecting the health of personnel assigned to work at the site. As such, all subcontractors and their personnel are required to comply with the provisions of the applicable project instructions cited in this section or as directed by the on-site BNI representative.

3.1 SUBCONTRACTOR TRAINING

Before the start of work, all subcontractor personnel attend an orientation session presented by the BNI representative to explain the nature of the material to be encountered in the work and the required personnel monitoring and safety measures.

3.2 SAFETY REQUIREMENTS

Subcontractor personnel must comply with the following BNI requirements.

- Bioassay Subcontractor personnel submit bioassay samples before or at the beginning of on-site activity, upon completion of the activity, and periodically during site activities as requested by BN1.
- Protective Clothing/Equipment Subcontractor personnel are required to wear the protective clothing/equipment specified in the subcontract or as directed by the BNI representative.
- o Dosimetry Subcontractor personnel are required to wear, and return daily, the dosimeters and monitors issued by BNI.
- Controlled Area Access/Egress Subcontractor personnel and equipment entering areas wherein access and egress are controlled for radiation and/or chemical safety purposes are surveyed by the BNI representative for contamination before leaving those areas.
- Medical Surveillance Upon written direction from BNI, subcontractor personnel who work in areas where hazardous chemicals might exist are given a baseline and periodic health assessment defined in BNI's Medical Surveillance Program.

Radiation and/or chemical safety surveillance of all activities related to the scope of work is under the direct supervision of personnel representing BNI.

The health physics requirements for all activities involving radiation or radioactive material are defined in Project Instruction No. 20.01, the Project Radiation Protection Manual and implementing procedures.

The industrial hygiene requirements for activities involving chemicals or chemically contaminated materials are defined in Project Instruction No. 26.00, the Environmental Hygiene Manual and implementing procedures.

Copies of these project instructions and manuals are located on-site for the use of subcontractor personnel.

4.0 CHARACTERIZATION PROCEDURES

A master grid was established by the surveyor; BNI's radiological support subcontractor, Thermo Analytical/Eberline (TMA/E), established a grid on individual properties. The size of the grid blocks is adjusted to adequately characterize each property. The grid origin allows the grid to be reestablished during remedial action and is correlated with the New Jersey state grid system. All data correspond to coordinates on the characterization grid. The grid and its east and north coordinates are shown on all figures of the property (Sections 4 and 5).

4.1 FIELD RADIOLOGICAL CHARACTERIZATION

4.1.1 Measurements Taken and Methods Used

An initial walkover survey using unshielded gamma scintillation detectors (2-in. by 2-in. thallium-activated sodium iodide probe) to identify areas of elevated radionuclide activity was performed. Near-surface gamma measurements taken using a cone-shielded gamma scintillation detector were also used in determining areas of surface contamination. Using the shielded detector ensured that the majority of the radiation detected by the instrument originated from the ground directly beneath the unit. Shielding against lateral gamma flux, or shine, from nearby areas of contamination minimized potential sources of error in the measurements. The measurements were taken 12 in. above the ground at the intersections of 10-ft grid lines. The shielded 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). This calibration demonstrated that 11,000 cpm corresponds to the DOE guideline of 5 pCi/g plus local average background of 1 pCi/g for thorium-232 in surface soils (Ref. 9).

A subsurface investigation was conducted to determine the depth to which the previously identified surface contamination extends and to

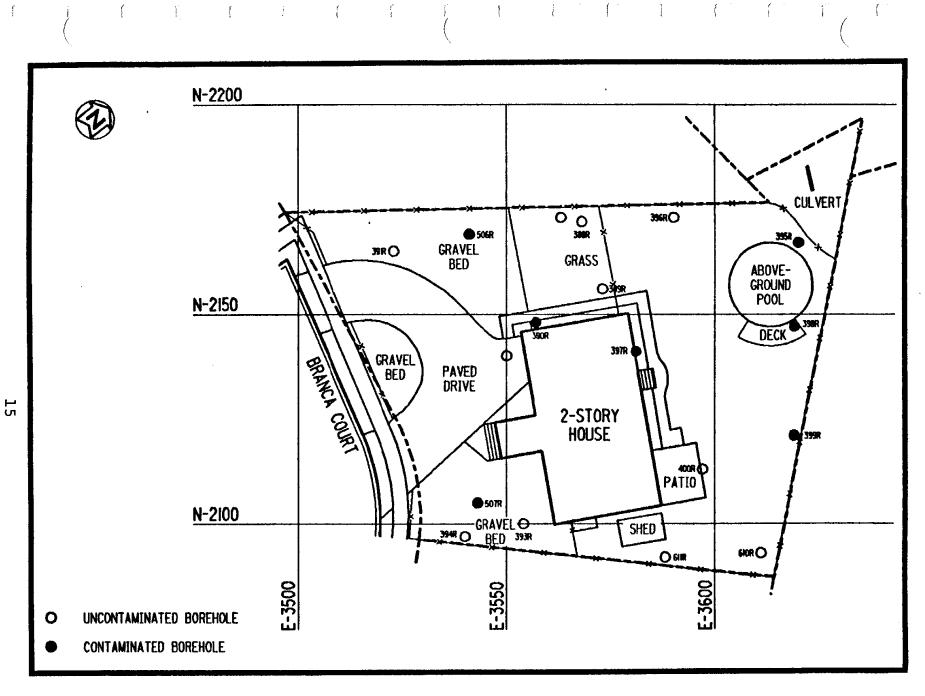
locate subsurface contamination where there is no surface manifestation. The subsurface characterization consisted of drilling and gamma logging 18 boreholes (Figure 4-1) using either a 3-in.- or 6-in.-diameter auger bit; holes were drilled to depths determined in the field by the radiological and geological support representatives.

The downhole gamma logging technique was used because the procedure can be completed more quickly than collecting soil samples, and it eliminates the need for analyzing these samples in a laboratory. 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 subsurface contamination guideline for thorium-232 in subsurface soils. This relationship has also been corroborated in results from previous characterizations where thorium-232 was found (Ref. 9).

Gamma radiation measurements were taken at 6-in. vertical intervals, and determined the depth and concentration of the contamination. The gamma logging data were reviewed to identify trends, regardless of whether concentrations exceeded the guidelines.

4.1.2 Sample Collection and Analysis

To identify surface areas where the level of contamination exceeded the DOE guideline of 5 pCi/g for thorium-232 in surface soils, areas with measurements of more than 11,000 cpm were plotted. Using these data as well as data from previous surveys (Refs. 5, 6, 7, and 8), the locations of biased surface soil samples were selected to better define the limits of contamination. Surface soil samples were taken at 18 locations (Figure 4-2) and analyzed for thorium-232 and radium-226. Each sample was dried, pulverized, and counted for 10 min using an intrinsic germanium detector housed in a lead counting cave lined with cadmium and copper. The pulse height distribution was sorted using a computer-based, multichannel



· (·]

ĺ

1

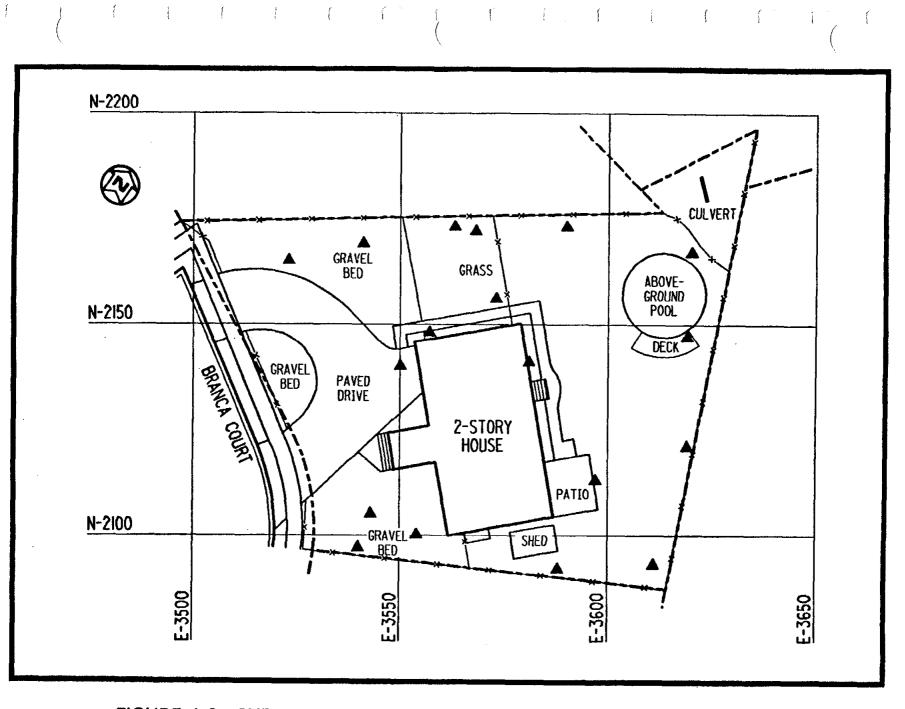
FIGURE 4-1 BOREHOLE LOCATIONS AT 11 BRANCA COURT

142.163 M38W9822.DGN

JKL.

ſ

ľ



(

í

FIGURE 4-2 SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS AT **11 BRANCA COURT**

16

Ĩ

ľ

{

analyzer. Radionuclide concentrations were determined by comparing the gamma spectrum of each sample with the spectrum of a certified counting standard for the radionuclide of interest.

Subsurface soil samples were collected from 18 locations (Figure 4-2) using the side wall sampling method and were analyzed to compare laboratory soil sample results to downhole gamma radiation measurements. A cup or can attached to a steel pipe or wooden stake was inserted into the borehole and used to scrape samples off the side of the borehole at a specified depth. The subsurface soil samples were analyzed for radium-226 and thorium-232 in the same manner as the surface soil samples.

4.2 BUILDING RADIOLOGICAL CHARACTERIZATION

After evaluating previous radiological survey data as well as data from this characterization, it was suspected that contamination might be present under the foundation of the residence. A radon measurement was obtained to verify the presence of contaminated material under the residence and to estimate potential occupational exposures during future remedial actions.

Indoor radon measurements were taken using the Tedlar bag technique. Using this method, radon measurements are obtained by pumping air into a Tedlar bag at a rate of approximately 2 1/min and transferring the air sample directly into a scintillation cell with an interior coating of zinc sulfide and an end window for viewing the scintillations. Analysis of the sample was simplified by allowing the radon decay products to build up over time. This method allows all the radon decay products to come into secular equilibrium with the radon. The scintillation cell was placed in contact with a photomultiplier tube, and the scintillations were counted using standard nuclear counting instrumentation.

Indoor air sample collection was also performed to determine working levels (WL) of radon daughters. Measurement of radon daughters was

done by collecting an air sample for exactly 5 min through a 0.45-micron membrane filter at a rate of 11 liters/min for a total sample volume of 55 1. Alpha particle activity on the filter paper was counted 40 to 90 min after sampling using an alpha scintillation detector coupled to a count-rate meter or a digital scaler.

5.0 CHARACTERIZATION RESULTS

5.1 FIELD RADIOLOGICAL CHARACTERIZATION

Near-surface gamma radiation measurements on the property ranged from 2,500 cpm to approximately 16,000 cpm. The average background level for this area is 5,000 cpm. A measurement of 11,000 cpm is approximately equal to the DOE guideline for thorium-232 of 5 pCi/g above background for surface soil contamination. Using this correlation, the near-surface gamma measurements were used to determine the extent of surface contamination as well as the basis for selecting the locations of soil samples.

Surface soil samples were taken from several locations on the property (Figure 4-2). These samples were analyzed for thorium-232 and radium-226. The concentrations in these samples ranged from 0.9 pCi/g to 11.3 pCi/g for thorium-232 and from 0.4 pCi/g to 2.0 pCi/g for radium-226. Analysis results for surface soils (depths from 0.0 to 0.5 ft) are provided in Table 5-1. Results showed concentrations of thorium-232 in excess of DOE guidelines (5 pCi/g plus background of 1 pCi/g for surface soils) with a maximum concentration of 11.3 pCi/g. Use of the "less than" (<) notation in reporting results indicates that the radionuclide was not present in concentrations that are quantitative with the instruments and techniques used. The "less than" value represents the lower bound of the quantitative capacity of the instrument and technique used and 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. The actual concentration of the radionuclide is less than the value indicated. 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 can be quantitatively determined has an associated uncertainty term (+), which represents

the amount by which the actual concentration can be expected to differ from the value given in the table. The uncertainty term has an associated confidence level of 95 percent.

Analysis results for subsurface soil samples given in Table 5-1 (depths from 0.5 to 1.0 ft) are consistent with the gamma logging data in Table 5-2. The results in Table 5-2 showed a range from 6,000 cpm to 130,000 cpm. A measurement of 40,000 cpm is approximately equal to the DOE guideline for subsurface contamination of 15 pCi/g. Analyses of subsurface soil samples indicated thorium-232 concentrations ranging from 1.0 pCi/g to 9.4 pCi/g and radium-226 concentrations ranging from 0.5 to 2.0 pCi/g.

On the basis of near-surface gamma radiation measurements, surface soil sample analysis, and downhole gamma logging, contamination of this property is believed to consist of surface and subsurface contamination. Areas of surface contamination are shown in Figure 5-1. Subsurface contamination ranges from 1.0 to 8.5 ft in depth. In addition, subsurface contamination is suspected to exist beneath the aboveground pool in the backyard. Areas of subsurface contamination are shown in Figure 5-2.

The vertical and horizontal limits of contamination as determined by this characterization effort are being evaluated to determine the volume of contaminated material that will require remedial action. To develop this estimate, BNI will consider the location of the contamination, construction techniques, and safety procedures.

5.2 BUILDING RADIOLOGICAL CHARACTERIZATION

Results of two indoor radon measurements made with the Tedlar bag method indicated concentrations of 0.4 and 0.8 pCi/l. These measurements were substantially less than the applicable DOE guideline of 3.0 pCi/l (Ref. 10).

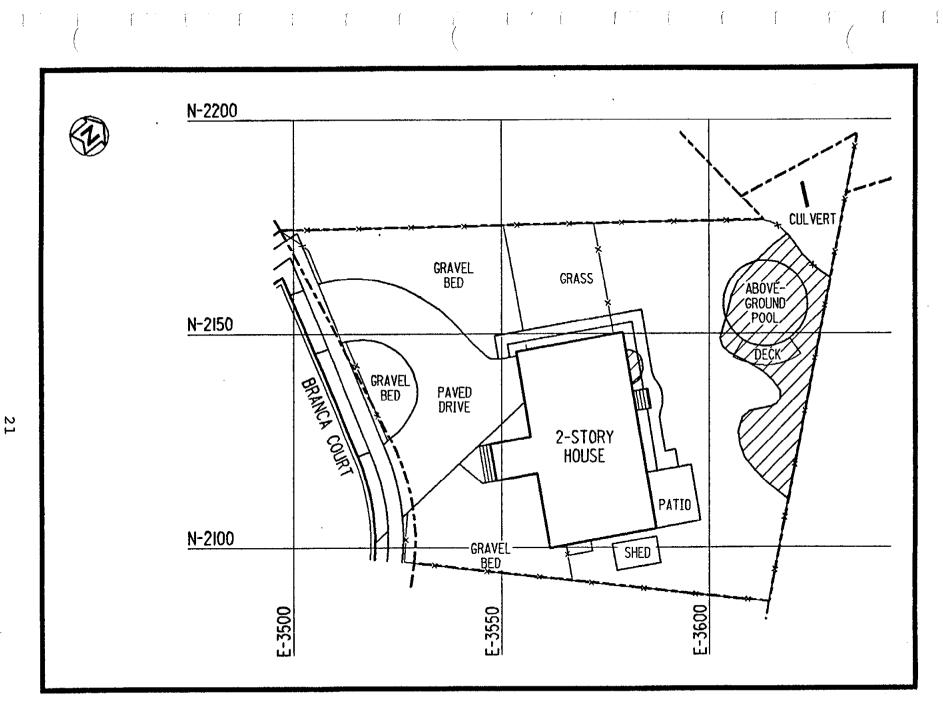


FIGURE 5-1 AREAS OF SURFACE CONTAMINATION AT 11 BRANCA COURT

·

JKL

ľ

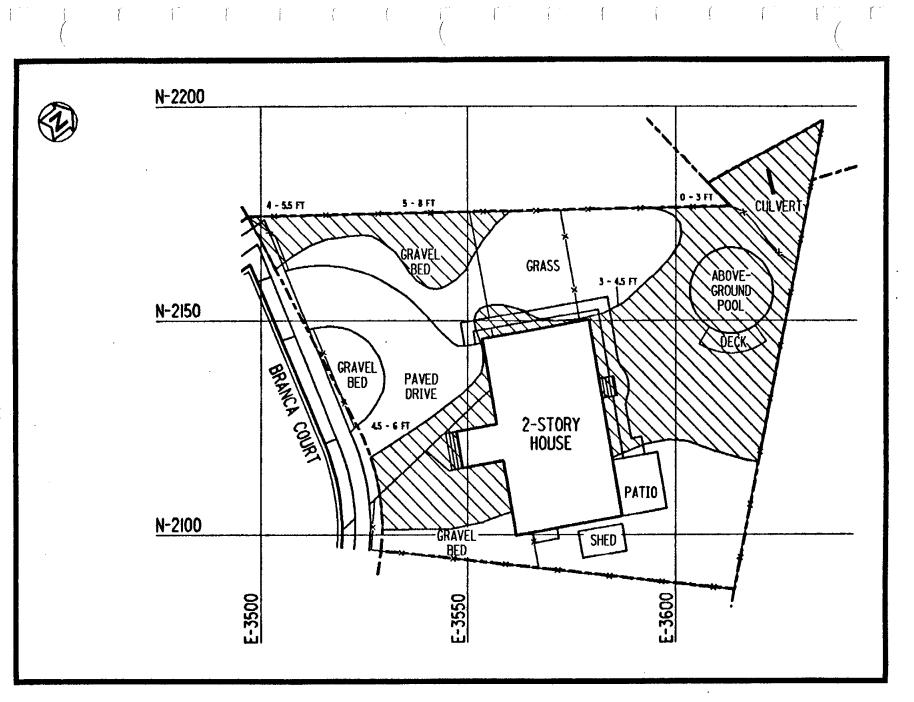


FIGURE 5-2 AREAS OF SUBSURFACE CONTAMINATION AT 11 BRANCA COURT

22

JKL

Results of measurements for radon daughters ranged from 0.003 to 0.004 WL and were substantially less than the applicable generic guideline (40 CFR 192) (Ref. 10) of an annual average (or equivalent) radon decay product concentration not to exceed 0.02 WL. Measurements for thoron daughters yielded negligible results.

Exterior gamma measurements were not obtained because of restricted access to the property.

SURFACE AND SUBSURFACE RADIONUCLIDE CONCENTRATIONS IN SOIL FOR 11 BRANCA COURT^a

ſ

Page 1 of 2

<u>Coordinates</u>		Depth	Concent	ration (pCi/g +/- 2 sig	ma)
East	North	(ft)	Uranium-238	Radium-226	Thorium-232
3523	2165	0.0 - 0.5	- b-	0.9 +/- 0.4	1.7 +/- 0.3
3523	2165	0.5 - 1.0	-b-	2.0 +/- 0.4	2.7 +/- 0.4
3540	2097	0.0 - 0.5	-b-	1.4 +/- 0.5	1.9 +/- 0.
3540	2097	0.5 - 1.0	-b-	1.0 +/- 0.3	1.3 +/- 0.3
3541	2169	0.0 - 0.5	- b-	0.7 + / - 0.3	0.9 +/- 0.
3541	2169	0.5 - 1.0	-b-	0.7 +/- 0.2	1.0 +/- 0.4
3543	2105	0.0 - 0.5	-b-	1.3 +/- 0.2	2.1 +/- 0.
3543	2105	0.5 - 1.0	-b-	0.5 +/- 0.3	1.7 +/- 0.1
3550	2140	0.0 - 0.5	- b -	0.7 + / - 0.4	1.5 +/- 0.3
3550	2140	0.5 - 1.0	-b-	< 1.1	2.2 + / - 0.6
3554	2100	0.0 - 0.5	-b-	0.6 +/- 0.3	2.0 +/- 0.
3554	2100	0.5 - 1.0	-b-	1.2 +/- 0.3	1.6 +/- 0.3
3557	2148	0.0 - 0.5	-b-	0.7 +/- 0.3	1.1 +/- 0.
3557	2148	0.5 - 1.0	-b-	1.7 +/- 0.5	1.4 +/- 0.9
3563	2092	0.0 - 0.5	-b-	2.0 +/- 0.5	2.2 +/- 0.
3563	2092	0.5 - 1.0	- b	< 1.3	< 2.0
3563	2173	0.0 - 0.5	- b-	1.0 +/- 0.3	1.4 + / - 0.1
3563	2173	0.5 - 1.0	- b -	1.1 +/- 0.7	1.8 +/- 0.9

24

ľ

TABLE	5-1
(contin	nued)

Coord	<u>linates</u>	Depth		ration (pCi/g +/- 2 sign	
East	North	(ft)	Uranium-238	Radium-226	Thorium-232
3568	2172	0.0 - 0.5	-b-	0.9 + / - 0.4	1.3 +/- 0.4
3568	2172	0.5 - 1.0	- b-	1.6 +/- 0.7	1.8 +/- 0.9
3573	2156	0.0 - 0.5	-b-	0.4 +/- 0.3	1.5 +/- 0.3
3573	2156	0.5 - 1.0	-b-	1.1 +/- 0.6	1.4 +/- 0.4
3581	2141	0.0 - 0.5	-b-	< 1.8	6.1 +/- 0.7
3581	2141	0.5 - 1.0	-b-	0.8 +/- 0.3	1.9 +/- 0.2
3586	2093	0.0 - 0.5	-b-	0.7 + / - 0.4	2.1 +/- 0.3
3586	2093	0.5 - 1.0	-b-	1.1 +/- 0.3	1.5 +/- 0.3
3590	2173	0.0 - 0.5	-b-	1.4 +/- 0.3	1.0 +/- 0.5
3590	2173	0.5 - 1.0	- b	0.5 + / - 0.4	2.5 +/- 0.3
3597	2113	0.0 - 0.5	-b-	0.8 +/- 0.3	1.6 +/- 0.4
3597	2113	0.5 - 1.0	-b-	< 1.2	1.8 +/- 0.3
3619	2121	0.0 - 0.5	-b-	0.7 +/- 0.5	4.4 +/- 0.5
3619	2121	0.5 - 1.0	-b-	< 1.2	3.3 +/- 0.5
3619	2147	0.0 - 0.5	- b-	< 1.5	5.2 +/- 0.6
3619	2147	0.5 - 1.0	- b-	0.8 +/- 0.3	5.6 +/- 0.7
3620	2167	0.0 - 0.5	- b -	< 1.9	11.3 +/- 0.9
3620	2167	0.5 - 1.0	-b-	0.9 + / - 0.4	9.4 +/- 0.5

^aSampling locations are shown in Figure 4-2.

^bAnalysis not requested.

TABLE 5-2

DOWNHOLE GAMMA LOGGING RESULTS FOR 11 BRANCA COURT^a

Page 1 of 6

<u>Coord</u> East	inates North	Depth ^b (ft)	Count Rate ^C (cpm)
Borehole	<u>388R</u> d		
3568	2172	0.5	11000
3568	2172	1.0	11000
3568	2172	1.5	13000
3568	2172	2.0	13000
3568	2172	2.5	13000
3568	2172	3.0	13000
<u>Borehole</u>	<u>389R</u> đ		
3573	2156	0.5	10000
3573	2156	1.0	11000
3573	2156	1.5	13000
3573	2156	2.0	14000
3573	2156	2.5	14000
3573	2156	3.0	18000
3573	2156	3.5	20000
3573	2156	4.0	21000
3573	2156	4.5	22000
Borehole	<u>390R</u> đ		
3557	2148	0.5	14000
3557	2148	1.0	15000
3557	2148	1.5	15000
3557	2148	2.0	14000
3557	2148	2.5	16000
3557	2148	3.0	19000
3557	2148	3.5	17000
3557	2148	4.0	21000
3557	2148	4.5	22000
3557	2148	5.0	21000
3557	2148	5.5	19000
3557	2148	6.0	20000
3557	2148	6.5	23000
	2148	7.0	
3557			27000
3557	2148	7.5	26000
3557	2148	8.0	16000
<u>Borehole</u>	<u>391R</u> d		
3523	2165	0.5	9000
3523	2165	1.0	13000

TABLE 5-2

(continued)

Page 2 of 6					
<u>Coordina</u> East	tes North	Depth ^b (ft)	Count Rate ^C (cpm)		
•••••					
<u>Borehole 39</u>	<u>3R</u> đ				
3554	2100	0.5	13000		
3554	2100	1.0	12000		
3554	2100	1.5	12000		
3554	2100	2.0	12000		
3554	2100	2.5	13000		
3554	2100	3.0	13000		
3554	2100	3.5	17000		
3554	2100	4.0	19000		
3554	2100	4.5	20000		
3554	2100	5.0	22000		
3554	2100	5.5	18000		
3554	2100	6.0	12000		
3554	2100	6.5	9000		
3554	2100	7.0	9000		
3554	2100	7.5	8000		
3554	2100	8.0	8000		
Borehole 39	<u>4R</u>				
3540	2097	0.5	9000		
3540	2097	1.0	11000		
3540	2097	1.5	12000		
3540 .	2097	2.0	12000		
3540	2097	2.5	12000		
3540	2097	3.0	13000		
<u>Borehole 39</u>	<u>5R</u> d				
3620	2167	0.5	40000		
3620	2167	1.0	46000		
3620	2167	1.5	53000		
3620	2167	2.0	109000		
3620	2167	2.5	29000		
3620	2167	3.0	14000		
3620	2167	3.5	11000		
3620	2167	4.0	10000		
3620	2167	4.5	8000		
3620	2167	5.0	6000		
3620	2167	5.5	7000		
3620	2167	6.0	10000		
3620	2167	6.5	10000		
3620	2167	7.0	11000		

27

TABLE !	5-2
---------	-----

(continued)

Page 3 of 6				
<u>Coordi</u> East	inates North	Depth ^b (ft)	Count Rate ^C (cpm)	
Borehole	<u>396R</u> đ			
3590	2173	0.5	9000	
3590	2173	1.0	10000	
<u>Borehole</u>	<u>397R</u> đ			
3581	2141	0.5	11000	
3581	2141	1.0	10000	
3581	2141	1.5	11000	
3581	2141	2.0	15000	
3581	2141	2.5	22000	
3581	2141	3.0	35000	
3581	2141	3.5	47000	
3581	2141	4.0	86000	
3581	2141	4.5	43000	
3581	2141	5.0	23000	
3581	2141	5.5	14000	
3581	2141	6.0	10000	
3581	2141	6.5	10000	
3581	2141	7.0	7000	
<u>Borehole</u>	398R ^d			
3619	2147	0.5	29000	
3619	2147	1.0	35000	
3619	2147	1.5	41000	
3619	2147	2.0	53000	
3619	2147	2.5	32000	
3619	2147	3.0	18000	
3619	2147	3.5	12000	
3619	2147	4.0	10000	
3619	2147	4.5	10000	
3619	2147	5.0	9000	
3619	2147	5.5	7000	
3619	2147	6.0	7000	
Borehole	<u>399R</u> d			
3619	2121	0.5	26000	
3619	2121	1.0	34000	
3619	2121	1.5	31000	
3619	2121	2.0	17000	
3619	2121	2.5	15000	

TABLE 5-2

____ ...

(continued)

Coordinates		Depth ^b	Count Rate ^C
East	North	(ft)	(cpm)
Borehole	399R (cont	<u>inued)</u> d	
3619	2121	3.0	14000
3619	2121	3.5	12000
3619	2121	4.0	10000
3619	2121	4.5	10000
3619	2121	5.0	9000
3619	2121	5.5	7000
3619	2121	6.0	7000
Borehole	400R ^d		
3597	2113	0.5	11000
3597	2113	1.0	12000
3597	2113	1.5	18000
3597	2113	2.0	22000
3597	2113	2.5	20000
3597	2113	3.0	19000
3597	2113	3.5	19000
3597	2113	4.0	15000
3597	2113	4.5	20000
3597	2113	5.0	9000
3597	2113	5.5	90 00
3597	2113	6.0	8000
Borehole	<u>506R</u> d		
3541	2169	0.5	14000
3541	2169	1.0	16000
3541	2169	1.5	16000
3541	2169	2.0	16000
3541	2169	2.5	16000
3541	2169	3.0	16000
3541	2169	3.5	17000
3541	2169	4.0	19000
3541	2169	4.5	25000
3541	2169	5.0	35000
3541	2169	5.5	• 79000
3541	2169	6.0	130000
3541	2169	6.5	84000
3541	2169	7.0	40000
3541	2169	7.5	33000
3541	2169	8.0	31000
3541	2169	8.5	33000

29

TABLE 5-2

(continued)

<u>Page 5 o</u>	f 6		<u>.</u>
<u>Coord</u> East	<u>inates</u> North	Depth ^b (ft)	Count Rate ^C (cpm)
Borehole	506R (cont	<u>inued)</u> d	
3541	2169	9.0	19000
3541 3541	2169 2169	9.5 10.0	17000 17000
Borehole	507R		
3543	2105	0.5	12000
3543	2105	1.0	13000
3543	2105	1.5	13000
3543	2105	2.0	15000
3543	2105	2.5	13000
3543	2105	3.0	15000
3543	2105	3.5	20000
3543	2105	4.0	26000
3543	2105	4.5	31000
3543	2105	5.0	36000
3543	2105	5.5	37000
3543	2105	6.0	34000
3543	2105	6.5	27000
3543	2105	7.0	16000
3543	2105	7.5	13000
3543	2105	8.0	12000
3543	2105	8.5	16000
3543	2105	9.0	14000
3543	2105	9.5	15000
<u>Borehole</u>	<u>610R</u> d		
3611	2093	0.5	11000
3611	2093	1.0	12000
3611	2093	1.5	12000
3611	2093	2.0	12000
3611	2093	2.5	12000
3611	2093	3.0	13000
3611	2093	3.5	13000
3611	2093	4.0 4.5	12000
3611 3611	2093 2093	4.5	13000 13000
3611	2093	5.5	12000
3611	2093	6.0	12000
3611	2093	6.5	12000
3611	2093	7.0	12000
	2075		22000

TABLE 5-2 (continued)

Page 6 of 6 Depthb Count Rate^C Coordinates East North (ft) (cpm) Borehole 611Rd 3588 2092 0.5 12000 3588 2092 1.0 13000 3588 2092 1.5 14000 3588 2092 2.0 13000 3588 2092 2.5 12000 3588 2092 3.0 12000 3588 2092 3.5 13000 3588 2092 4.0 12000 3588 2092 4.5 11000 3588 2092 5.0 10000 3588 2092 5.5 11000 Borehole (unnumbered)^e 3550 2140 0.5 10000 3550 2140 1.0 12000 Borehole (unnumbered)^f 3563 2173 0.5 8000 3563 2173 1.0 10000 3563 2173 1.5 13000 aBorehole locations are shown in Figure 4-1. ^bThe 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. ^cInstrument used was 2-in. by 2-in. thallium-activated sodium iodide gamma scintillation detector. d Bottom of borehole collapsed. ^eNo borehole number assigned (refusal at 1 ft). ^fNo borehole number assigned (refusal at 1.5 ft).

REFERENCES

- U.S. Department of Energy. <u>Description of the Formerly</u> <u>Utilized Sites Remedial Action Program</u>, ORO-777, Oak Ridge, TN, September 1980 (as modified by DOE in October 1983).
- Argonne National Laboratory. <u>Action Description Memorandum,</u> <u>Interim Remedial Actions at Maywood, New Jersey</u>, Argonne, IL, March 1987.
- 3. Argonne National Laboratory. <u>Action Description Memorandum</u>, <u>Proposed 1984 Remedial Actions at Maywood</u>, <u>New Jersey</u>, Argonne, IL, June 8, 1984.
- Bechtel National, Inc. <u>Post-Remedial Action Report for the</u> <u>Lodi Residential Properties</u>, DOE/OR/20722-89, Oak Ridge, TN, August 1986.
- 5. NUS Corporation. <u>Radiological Study of Maywood Chemical</u>, <u>Maywood</u>, <u>New Jersey</u>, November 1983.
- EG&G Energy Measurements Group. <u>An Aerial Radiologic Survey of</u> the Stepan Chemical Company and Surrounding Area, Maywood, <u>New Jersey</u>, NRC-8109, Oak Ridge, TN, September 1981.
- 7. Oak Ridge National Laboratory. <u>Results of the Mobile Gamma</u> <u>Scanning Activities in Lodi, New Jersey</u>, ORNL/RASA-84/3, Oak Ridge, TN, October 1984.
- Oak Ridge National Laboratory. <u>Results of the Radiological</u> <u>Survey at 11 Branca Court (LJ043)</u>, Lodi, New Jersey, ORNL/RASA-86/35, Oak Ridge, TN, September 1986.
- 9. Letter, Jeff Brown, Thermo Analytical/Eberline, to Distribution. "Technical Review of Grand Junction Instrument Correlation Study," BNI CCN 035506, March 17, 1986.

10. U.S. Code of Federal Regulations. 40 CFR 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, " Washington, D.C., July 1986.

APPENDIX A

GEOLOGIC DRILL LOGS FOR 11 BRANCA COURT

LODI, NEW JERSEY

	—							-	PROJE	СТ		JOB NO. SHE	ET NO.	IOLE NO.
		G	iEC	DLOG	ilC D	RIL	L LC)G				FUSRAP 14501-138 1		388R
	SITE							COORDIN	ATES				OM HORIZE	
				Branca					r				tical	
نىر_	BEGL			MPLETE			DETE	ENCH					K (FT.) 1	OTAL DEPTH
~								ENCH	P CAS			S little beaver 4" 4.0 ROUND EL. DEPTH/EL. GROUND WATER DEPTH	I/EL. TOP O	4.0
	1		1									43.4	/	
	SAMP	LE H		R WEIGH	T/FALL	CAS	SING LE	FT IN HO	LE: DI	A./I	EN	IGTH LOGGED BY:	<u></u>	
				N/A				NO	NE			D. MCGRANE		
	DIAM.	SAMP. ADU. LEN CORE		SAMPLE BLOUS "N" X CORE	PR	WATER	RE			Ŋ				
	L A	ЯĞ	<u></u> Ц С Ш С		<u>.</u>	TESTS		ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES C	
	<u>.</u>	₽ Z	L L L L L L L L L L L L L L L L L L L	MAN OC) () () () () () () () () () () () () () () () () (SH S	HINE MIN.			Ā	ЧH		WATER F	RETURN,
	Sem B B D D D D D D D D D D D D D D D D D D	<u>г</u> М	ΞŌ		Loss Loss R. P. M	PRESS. P. S. I.	분변분	43.4	-	6	n	•	DRILLIN	IG, ETC.
			шı								Ħ	0.0 - 4.0 FT. <u>SILTY SAND</u> (SM). Color stratified; fine to medium grained; soft;	Borehole	
									-			numerous rounded and angular nebbles and	4.0 ft. usin solid-sten	
												drilling); poorly consolidated (loose);		
									-			gravel of mixed lithologies (difficult drilling); poorly consolidated (loose); numerous grass roots and organics; moist. 0.0-0.3 ft., moderate brown (5 YR 3/4);		
								39.4_	-	li: · · ·		garden soil. 0.3-4.0 FT., dark reddish brown, (10 R	ſ	
		•							-	1		3/4).	Site check	
												Bottom of boring at 4.0 FT. Borehole	radioactiv contamina	ation and
												backfilled with auger spoils, 10-3-86. NOTE: Did not penetrate below disturbed	hole gamn by Eberlin	na-logged ne-TMA,
										l		soils; auger refusal.	Corp. No ground	i water
													observed.	
													Auger refu	usal at 4.0
													ft. Cobble	e?
												•		
											$\ $		Descriptio	n and
ł													classificati samples by	on of soil
													examinatio	
														ŀ
}								ITE			Ц			
				POON; S1			/			1	1	Branca Ct. LODI	HOLE NO.	8R
							· · · · · · · · · · · · · · · · · · ·							

		•							PROJE	СТ	JOB NO. SHEE	T NO. HOLE NO.
	L	G	iec)LOG	IC D	RIL		G		<u>. </u>	FUSRAP 14501-138 1	OF 1 389R
	SITE				a	027		COORDIN	ATES		ANGLE FRO	M HORIZBEARING
	BEGL			Branca MPLETED				J		DP 1 !	N 2156; E 3573 Vertin MAKE AND MODEL SIZE OVERBURDEN ROCK	CAL (FT.) TOTAL DEPTH
				0-3-8			RETR	ENCH			kS little beaver 4" 6.0	6.0
	CORE	REC	OVER	Y (FT./)	() CORE	BOXE	SAMPL	ESEL. TO	P CAS	ING		EL. TOP OF ROCK
	SAMP	LE H		R WEIGHT	/FALL	CAS	ING LE	FT IN HO	LE: DI	A./L	43.7 1 / / / / / / / / / / / / / / / / / /	/
				N/A				NO			D. MCGRANE	
	Щ.	்ய		~ ~	PR	JATER				S		· · · ·
	μ	SAMP. ADU. LEN CORE	R R	SAMPLE BLOWS "N" % CORE RECOVERY		TESTS	\$`	ELEV.	DEPTH	GRAPHICS		NOTES ON: WATER LEVELS,
	ц. Но	d Z	122		LOSS LOSS G.P.M	കല	TIME MIN.			AP		WATER RETURN, CHARACTER OF
	B NA N	r N	N N N N N N N N	. ๆ. , ₈	5.6	PRES.	FTE	43.7		Ö		DRILLING, ETC.
											Fill and natural material: color	Borehole drilled 0 - 6.0 ft. using 4"
											stratified; fine to medium grained; soft;	solid-stem augers.
											0.0-0.5 ft., moderate brown (5 YR 3/4); garden soil. 0.5-5.0 FT., dark reddish brown, (10 R	
										┨╢	3/4). A few pieces of black carboniferous gravel, sandstone gravel and glass (fill).	
									5.	- []		Site checked for
								37.7_	-		clayey (SC).	radioactive contamination and
												hole gamma-logged by Eberline-TMA,
											Bottom of boring at 6.0 FT. Borehole	Corp. No ground water observed.
											NOTE: Unable to determine if auger penetrated below disturbed soils; auger	Ubbeiveu.
											refusal.	Auger refusal at 6.0 ft. Cobble?
······												
:												
1												
											1	
:												
:		ł										
									ļ			Description and
	ļ											classification of soil samples by visual
												examination.
:				POON; ST			/ [ITE		4		HOLE NO.
	D =	DENN	I SON ;	P = PI	TCHER;	0 = 0	THER			1	1 Branca Ct. LODI	389R

									PROJEC	T			JOB NO.	SHE	T NO.	HOLE NO.
			EU)LOG		RILI					FUSRAP			138 1		390R
	SITE		11 B	Branca	C+ 1	UDI		COORDINA	TES		N 2148; E 35	57	ŕ	NGLE FR	M HORIZ	BEARING
	BEGU			MPLETED					i		MAKE AND MODEL	SIZE	OVERBURDEN		(FT.)	TOTAL DEPTH
				0-3-80	5	MO		ENCH		B	&S little beave	r 4"	9.0			9.0
	CORE	REC	OVER	Y (FT./X	CORE	BOXE	SSAMPL	ESEL. TO	P CASI	NG		PTH/EL. GR 8.0/35.8	OUND WATER 10-3-86	DEPTH	EL. TOP	OF ROCK
	SAMP	LE H		RWEIGHT	ZEALL	ICAS	ING LE	FT IN HOI	E: DI	A./L	43.8	1		1	/	· · · · · · · · · · · · · · · · · · ·
Ì			1	N/A				NO				-	D. MCGR	ANE		
	Ш.	5 Iu	<u>.</u>	<u>بر ایت</u>		JATER				b						
	SAMP. TYPE	LEN COR	AMPLE REC	SAMPLE BLOWS "N" X CORE RECOVERY	COSS LUCSS G. P. M G. P. M	FESTS		ELEV.	DEPTH	GRAPHICS	ฟ DESCRIPT: ช ผ	ION AND	CLASSIFICA	TION	WATER CHARAC	LEVELS, RETURN, CTER OF
	₩ A				5			43.8	- - - - - - - - - - - - - - - - - - -		0.0 - 9.0 FT. Color strat soft; poorly saturated a 0.0-5.0 FT. 3/4). 5.0-5.2 pale green (10 YR 6/6 5.2-6.0 FT 6.0-7.0 FT 7.0-9.0 FT	fied; fine to consolidat: t 8.0 ft. , dark redd (5 G 7/2), 6), and gray , dark redd , moderate , dark redd	ND (SM-SC). medium graine ed (loose); moisi ish brown, (10 l seam (SC); mediark yellowish o ish black (N2). ish brown. ish brown. T. Borehole poils, 10-3-86.	t - R	DRILLI Borehold 9.0 ft. u: solid-ste Site che- radioact contami hole gan by Eber Corp. Ground observed	tNG, ETC. e drilled 0 - sing 4" em augers. cked for ive nation and nma-logged line-TMA, water d, 10-3-86.
				 				ITE		1	1 Branca (Ct. LOI	DI	١	HOLE NO	90R

, **~** ...

.

STE DORDINATES N 2165; E 3323 Unclifted for the R0215eest TEGUN DORPETED DATILER PERLANKE AND MODEL SIZE DVERBURGEN ROCK (FT) 10-3-86 10-3-86 MORETRENCH B&S little baser 2.0 ROCK (FT) DOI CORE RECORDER/OFFICE DORE BOOKESHAPE DESILT. TOP CASING GROUD EL. SIZE DVERBURGEN MORETRENCH B&S little baser 2.0 CORE RECORDER (FT.RE) DORE BOOKESHAPE DESILT. TOP CASING GROUD EL. DEPTIVEL. CROW MATER DEPTIVEL. TOP OF MARCE WEIGHT/FALL DATER PRESSURE PRESSURE D. MCGRANE Waster State Destation of the State St	—	_								PROJE	CT		I I	ET NO. HOLE NO.
11 Brance Ct. LODI N 2165; E 3523 Vertical Descart Completed particles partic MARE MAD MOREL Size pressure pressure <td< td=""><td>SITE</td><td></td><td></td><td></td><td>G</td><td></td><td>KILI</td><td></td><td></td><td>TES</td><td></td><td></td><td></td><td></td></td<>	SITE				G		KILI			TES				
10-3-86 10-3-86 MORETRENCH B&S. Initie beaver 4" 2.0 CORE RECOVERY (FT./X) CORE BOXESSAMPLESEL. TOP CASING GROUND EL. DEFTN/EL. GROUND WATER DEFTN/EL. TOP OF SAPLE MAMER MEIGHT/ALL CASING LEFT IN HOLE: DIA/LEWITH LOGED BY: D. MCCGRANE NA NONE D. MCCGRANE MATER PROVIDE SUMPLESEL Bottom of bottom of bottom of bottom and bottom of bottom of bottom of bottom and bottom. D. MCCGRANE MATER LEWITH Bottom of bottom of bottom of bottom and bottom of bottom													N 2165; E 3523 Vert	ical
CORE RECOVERY (FT./G) CORE BOXESISAPILESEL. TOP CASING GROUND EL. DEPTW/EL. GROUND MATER DEPTW/EL. TOP OF 44.4 4 / /// SAMPLE MAMMER VEIGHT/TALL DASING LEFT IN NOLE: DIA./LENTH LOGED DY: N/A NONE DATER RE C C C C C C C C C C C C C C C C C C C								RETR	ENCH				1 1 1	(FT.) TOTAL DE 2.0
SAMPLE MAMEER WEIGHT/TALL CASING LEFT IN HOLE: DIA./LEMITH LOGED BY: N/A NONE DATES PRESSURE C C C C C U U U U U U U U U U U U U U U										P CAS			ROUND EL. DEPTH/EL. GROUND WATER DEPTH,	
Image: State of the state o	SAMP	LE H	/ Iamme	RWEI	GHT	/FALL	CAS	ING LE	FT IN HOL	E: D1	A./		44.4 1 /	/
42.4 42.4									NO	NE	T		D. MCGRANE	1
42.4 42.4	AM.	200.		щZ	Ĕ	PR	ESSU	RE		r	S	Щ		NOTES ON:
42.4 42.4		- U		N PL	őö	ŋΣ.			ELEV.	EPT	H		DESCRIPTION AND CLASSIFICATION	WATER LEVELS
42.4 0.5 - 2.0 FT. JELTY SAND (SM). Fill material; dark redials forwar, (10 R 3/4); file to redial more an pithology; soft; unconcolidated; most. 20 FT. bershole backfilled with suger spoin, 10-3-86. Bottom of boring at 2.0 FT. Borshole backfilled with suger spoin, 10-3-86. Site checked redicative contamination observed. Auger refus Auger refus Bottom of boring at 2.0 FT. Borshole backfilled with suger spoin, 10-3-86. Site checked redicative contamination observed. Bottom of boring at 2.0 FT. Complexity and backfilled with suger spoin, 10-3-86. Site checked redicative contamination observed. Bottom of boring at 2.0 FT. Borshole backfilled with suger spoin, 10-3-86. Site checked redicative contamination observed. Bottom of boring at 2.0 FT. Borshole backfilled with suger spoin, 10-3-86. Site checked redicative contamination observed. Bottom of boring at 2.0 FT. Borshole backfilled with suger spoin, 10-3-86. Site checked redicative contamination observed.	题	LEV	PMP		×Щ	STIC S	<u>н</u> Ш				GR	ŝ		CHARACTER OF DRILLING, ET
Image: Second	Ľ,	•7	10.	<u> </u>										Borehole drilled 0 2.0 ft. using 4"
Ithology; soft; unconsolidated; moist. Bottom of boring at 2.0 FT. Borehole backfilled with auger spoils, 10-3-86. Note gamma hy Eberina- Corp. Observed. Auger refus: ft. Cooble?									42.4_				0.3 - 2.0 FT. <u>SILTY SAND</u> (SM). Fill material; dark reddish brown, (10 R 3/4);	solid-stem augers.
backfilled with auger spoils, 10-3-86. Site checked contamination by Cop- No ground a observed. Auger refus ft. Cobble? Description classification c													pieces of gravel and cobbles of mixed lithology; soft; unconsolidated; moist.	
backfilled with auger spoils, 10-3-86. Site checked radioactive contamination by Cop- No ground a observed. Auger refus ft. Cobble? Description classification classification agents by Cop- No observed. Auger refus ft. Cobble?										_			Bottom of boring at 2.0 FT. Borehole	1
hole gamma by Berline Corp. No Berred. Auger refus: ft. Cobble?													backfilled with auger spoils, 10-3-86.	Site checked for radioactive contamination and
Description classification														hole gamma-logge by Eberline-TMA
Description classification gassification										5				No ground water
Description classification gassification														Augen netweel et 2
classification samples by														ft. Cobble?
classification samples by														
classification samples by														
classification samples by														
classification samples by														
classification samples by														
classification samples by														
classification samples by														
classification samples by														
classification samples by														
classification samples by														
classification samples by														
classification samples by														
classification samples by											ĺ			
classification samples by														
classification samples by														Description and
examination														classification of so samples by visual
														examination.
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.	SS =	SPI			ST	= SHFI		BE S	ITE					HOLE NO.
												11	Branca Ct. LODI	391R

•-- -

		_								PROJE	CT						IOB NO.	SH	EET NO.	HOLE NO.
			EC		GI		RIL	L LC					FUSR	RAP			4501-	138	1 OF 1	393R
	SITE			~	_				COORDIN	ATES							A		ROM HORIZ	BEARING
	BEGL			Branc		DRILL			<u> </u>	·	OD TH		2100; H		0.175	-			rtical	
				0-3-				RETR	ENCH	ľ			E AND NO little be		SIZE 4"	OVER	BURDEN 9.0	RO	CK (FT.)	TOTAL DEPTH
			_			CORE			ESEL. TO	P CAS			ND EL.	DEPTH/	EL. GRO	UND WA	TER	DEPT	H/EL. TOP	
													44.9	¥ /	/36.9 1	0-3-86	•		/	
	SAMF	PLE H		R WEIG	GHT/	FALL	CAS	SING LE	FT IN HO		A./L	ENGT	H LOGGEI	D BY:						
				<u>N/A</u>	T	. <u> </u>	JATER		NO	NE T		77				<u>D.</u>	MCGR	ANE		
	DIAM.	SAMP. ADU. LEN CORE		SAMPLE BLOWS "N" X CODF	Ъ.	PR	ESSU	RE		-	S									
	L,	€ 0	ШX	μŋς				r	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRI	(PTION	AND C	LASS	IFICA	TION		LEVELS,
	SAMP	ΠN	电路	Se X		LOSS IN G.P.M	PRESS.	TIME MIN.		B	RAF	S								RETURN, TER OF
	8ª	r IS	δ Ω	E.	α.	- <u> </u>	<u> </u>	FΣ	44.9		ō									ING, ETC.
												0	.0 - 9.0 H and na	T. <u>SIL</u> tural ma	<u>FY SAN</u> terial: c	0 (SM- olor sti	SC). Fi	ill	Borehole 9.0 ft. u	e drilled 0 - sing 4"
													fine to	medium dated (lo	grained:	soft: D	oorly			em augers.
						j							8.0 ft. 0.0-5.0	FT., dai	rk reddis	h brow	n. (10 R	2		
													- 3/4) . J	A few blo piece of	cks and	pieces.	of sands	tone		
										5_										
				ĺ									18011	FT., gra			1	У	Site che radioact	cked for ive
													floodpl: 6.5 - 7.	ain sedin 0 FT p	nents? ale green	(5 G 1	7/2):		l contami	nation and nma-logged
									7	Ę -			clayey 7.0-9.0	ain sedin 0 FT., p (SC). FT., du	sky red (5 R 3/	4).		by Eber Corp.	line-TMA,
		1							35.9_					•	- · ·		,		Ground	water 1, 10-3-86.
												F	lottom of	boring a	t 9.0 FT	. Bore	hole		7	,
													backfill	ed with a	auger sp	oils, 10	-3-86.			
							-													
		[
												ĺ								
											ľ									
							1													
								Ì												
l					1			l											Descripti	
1																			samples	
																			examinat	HON.
	SS =	SPLI	T SP	00N; 1	ST =	SHEL	BY TU	BE; SI	TE	1					• • =				HOLE NO.	
				P = 1							1	<u>1 E</u>	Franca	<u>a Ct.</u>	LOD	I		`	.3	93R

		GE	50	LC	G	С	D	RIL	LL			PRO		.T		F	USR	AP						-13	8 1	T NO. OF 1	HOLE NO.
SITE		1 1	T D	Fa P	<u></u>	C+	10	DDI	_		COORD I	NATES			N	209	7· 1	7 3 5	40						e fro Verti	M HORIZ	BEARING
BEGL	JN			MPLE	-	A							ľ			AKE A			_	SIZE		OVERE		<u></u>		(FT.)	TOTAL DEP
10-	-3-	86	1	0-3	-86						ENCH					littl				4'			3.5				3.5
CORE	E RE	CO	/ERY /	(F1	i ./%		ore	BOXE	SSAM	IPLE	SEL.	OP C	ASI	NG	GRC	44.		DEF	PTH/E	L. G	ROUI	ID WA	IER	D	EPIH/	EL. 10P	OF ROCK
SAMP	LE	HAP	MER	WEI	GHT	/FAL	.L	CAS	SING	LEF	T IN H	OLE:	DI	A./L	ENG			D BY:	:	·						/	
			1	<u>N/A</u>	<u></u>						<u>N(</u>)NE										D . I	MCG	RA	NE	=	
DIAM.	2	ψĽ		SAMPLE BLOWS "N"			PRE	ATE	RE					8												NOTES	0.11
ίų	SAMP. ADV.	<u>מ</u> ומ		15	NOR NOR			EST	r	-	ELEV	DEPTH	:	GRAPHICS	SAMPLE	DES	SCRI	IPTI		AND	CL	_ASS	IFIC	ATI		WATER	LEVELS,
<u>Б</u>	Ē	3		200	202	LOSS		PRESS.	HIME NIT	Ľ.			1	RAF													RETURN, TER OF
Same	SPI SPI	2 2 2	CORE R	<u></u>	œ	<u>ב</u>	ø		F	Σ	44.	5		U								100 1		_ ·			ING, ETO
																0.0 ~ m	3.5 I ateri	FT. <u>:</u> al?;	<u>SILT</u> çolor	Y S/	tifie	(SM) 1; fi). Fill ne to			3.5 ft. u	e drilled 0 sing 4"
																m ar	ediur id co	m gra bbles solida	s of n	with	l Iew lith	ology	es of g ; soft;	ravei		80110-85	em augers.
	ļ										41					0.	0-2.5	5 FT.	. dar	k red	idish	brow	/n, (10) R			
											41.	4		لنصل	th	2.	5-3.5	5 FT.	, mo	derat	e br	own (5 YR	3/4).	· [
													-	4	$\left \right ^{L}$	Bott	om of	f bori	ing p	t 3.5	FT	Bor	ehole			Site che	cked for
Bottom of boring at 3.5 FT. Borehole backfilled with auger spoils, 10-3-86.															radioac	ive nation and											
																							hole gat by Eber	nma-logge line-TMA,			
																										Corp. No grou	nd water
																										observe	d.
																										Auger r ft. Cob	efusal at 3.
							ŀ																			IR. Cod	Die :
					-																						
			•																								
										}																	
																										ţ	
						ł																					
						ļ																					
						ł																					
									1																		
																										Descrit	tion and
1																										classific	tion and ation of so by visual
									}																	examin	ation.
																						•					
SS :	= SI	PLI	τs	l Poon	; 51	 =	SHEL	LBY T	UBE;	s	TE	 		. I					.		<u> </u>	•		·····		HOLE NO	
								0 = :						1	11	Bra	anc	ca (Ut.	L	JD	I					394R

1		0	C.	DLOG					PROJE	CT				JOB NO		ET NO.	HOLE NO.
	SITE							COORDIN	ATES			FUSRAP			-138 1	OF 1 OM HORIZ	395R
	ſ		11 I	Вгапса	Ct. I	ODI					N	2167; E 3620			Vert		
1	BEGU			OMPLETE			DETE	The second					SIZE	OVERBURDEN	ROCI	((FT.)	TOTAL DEPTH
				0-3-8				ENCH	P CAS			little beaver DUND EL. DEPTH/	4" EL. GRO	9.0	DEPTH	/EL. TOP	9.0 OF ROCK
			1									43.3 🕎 /	6/36.8 1	0-3-86		/	
	SAMP	LE P	2	R WEIGH N/A		CAS	SING LE	FT IN HO NO		A./L	.ENG	TH LOGGED BY:		D. MCG	RANE		
	ų.	SAMP. ADV. LEN CORE		SAMPLE BLOWS "N" X CORE	; Pi	WATER	RE			ő	Π						
	L H	A Q	E E E	14 S S S		TESTS	T	ELEV.	DEPTH	Η̈́Η	SAMPLE	DESCRIPTION	AND (CLASSIFIC	ATION		LEVELS,
		Δ N N N	E E E E E E E E E E E E E E E E E E E			PRES:	TIME MIN.		B	GRAPHICS	R					CHARAC	RETURN,
	ଜିଙ୍କ	5						43.3			╢	0.0 - 9.0 FT. SILT	TY SAN	D (SM-SC).	Fill	1	NG, ETC. e drilled 0 -
									-			and natural may	terial: c	olor stratified	1:	9.0 ft. u	
									-			fine to medium sub-rounded pe soft; poorly con	solidate	d (loose); mo	ogies; jist -		
									-			saturated at 6.5 0.0-3.0 FT., dai 3/4). Numerou	rk reddi	sh brown, (10 oots and org	R anics at		
									5			E111 0 0 0					
									<u>↓</u> -			3.0-5.0 FT., cla grayish black (I gray (N5), and YR 6/6). 5.0-9.0 FT., dau	dark yel	lowish orange	(10 e (10	radioact	cked for ive nation and
								•	ŧ -			5.0-9.0 FT., da	rk yellov	vish orange.		hole gan	nma-logged line-TMA,
									-							Corp.	water
					Î			\$4.3_	1.		Ħ	Bottom of boring a	at 9.0 F7	r. Borehole			d, 10- 3-8 6.
												Bottom of boring a backfilled with	auger sp	oils, 10-3-86	•		
						1											
:																	
	.																
		l															
					1												
						1											
					1							•					
					1						-						
l																Descript	ation of soil
			ļ		1											samples examina	by visual tion.
			ļ		1												
															•		
				POON; S ; P = P				ITE	1	ن <u>ــــ</u>		Branca Ct.)	·	HOLE NO	95R
		UCRN	1301	, r = P	I I UNEK	, , , , , ,	n ngK			<u> </u>					`	J	3311

÷.....

~~~

|   |                                               |             |            | · · · ·                                   |             |                                                                                                  |              |               | PROJE    | ст               |        | <u> </u>                                    |                          | JOB NO                       | SHE     | ET NO.                      | HOLE NO.                   |
|---|-----------------------------------------------|-------------|------------|-------------------------------------------|-------------|--------------------------------------------------------------------------------------------------|--------------|---------------|----------|------------------|--------|---------------------------------------------|--------------------------|------------------------------|---------|-----------------------------|----------------------------|
|   |                                               | G           | EC         | LOG                                       | IC D        | RILI                                                                                             | L LO         | G             |          |                  |        | FUSRAP                                      |                          |                              | -138 1  |                             | 396R                       |
|   | SITE                                          |             |            |                                           |             |                                                                                                  |              | COORDIN       | ATES     |                  |        |                                             |                          |                              | ANGLE F | ROM HORIZ                   |                            |
|   | DECI                                          |             |            | Branca<br>MPLETED                         |             |                                                                                                  |              |               |          | 0011             |        | 2173; E 3590                                |                          |                              |         | tical                       |                            |
|   | BEGL                                          |             |            | MPLETED<br>0-3-86                         | i           |                                                                                                  | RETR         | ENCH          |          |                  |        | KE AND MODEL<br>little beaver               | SIZE<br>4"               | OVERBURDEN                   |         | K (FT.)                     | TOTAL DEPTH                |
|   |                                               |             |            |                                           |             |                                                                                                  |              | ESEL. TO      | P CAS    |                  |        | UND EL. DEPTH                               | EL. GROU                 | IND WATER                    | DEPTI   | I/EL. TOP                   |                            |
|   | CAMP                                          | H R H       |            | R WEIGHT                                  | 75411       | -                                                                                                |              | FT IN HO      |          |                  |        | 43.3 1 / /                                  |                          |                              |         | /                           |                            |
| 1 | -3AMP                                         | 12 1        |            | N/A                                       | JTALL       | ~~~                                                                                              | , NG LE      | NO            |          | 17./6            | LENU   | IN LOUGED BI:                               |                          | D. MCG                       | RANE    |                             |                            |
|   | ш.                                            | <u>ار ا</u> | <u>i</u> . | SAMPLE<br>BLOWS "N"<br>X CORE<br>RECOVERY |             | JATER                                                                                            |              |               | Ī        | ر<br>ا           | TT     |                                             |                          |                              |         | 1                           |                            |
| ł | DIAM.                                         | CORE        |            | Щ, щ<br>М, щ<br>К                         |             | TESTS                                                                                            |              | ELEV.         | Ŧ        | GRAPHICS         | H      | DESCRIPTION                                 | AND C                    | LASSIFIC                     | ATION   | NOTES                       | ON:<br>LEVELS,             |
|   | 0.<br>1                                       | <u>∎</u> Z  | 12         | E S S S S S S S S S S S S S S S S S S S   | ω<br>Σ<br>Ω | юн<br>Ю                                                                                          | TIME<br>MIN. |               | DEPTH    | 1<br>T<br>T<br>T | SAMPLE |                                             |                          |                              |         | WATER                       | RETURN,                    |
|   | SAMP                                          | SAMP.       |            |                                           | G. P. M     | 5<br>5<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | 부부분          | 43.3          | -        | B                |        |                                             |                          |                              |         |                             | CTER OF<br>Ing, ETC.       |
|   |                                               |             | ш <i>и</i> |                                           |             |                                                                                                  |              | 10.0          |          |                  |        | 0.0 - 2.5 FT. <u>SIL</u><br>material; color | TY SANI                  | (SM). Fill<br>fine to        |         | Borehol<br>2.5 ft. u        | e drilled 0 -<br>sing 4"   |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          | ]                |        | medium graine<br>and cobbles of             | d; numer<br>mixed lit    | ous pieces o<br>hology; soft | :       | solid-st                    | em augers.                 |
|   |                                               |             |            |                                           |             |                                                                                                  |              | <b>4</b> 0.8_ | {        | كنار             | 4      | unconsolidated<br>0.0-0.3 FT., m            | l; moist.<br>oderate b   | rown (5 YR                   | 3/4);   | ſ                           |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        | numerous grass<br>0.3-2.5 FT., da           | s roots an<br>ark reddis | h brown, (10                 | R       |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               | .        | -                | L      | 3/4).                                       |                          |                              |         | Site che                    | cked for                   |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        | Bottom of boring<br>backfilled with         | at 2.5 FT<br>auger sp    | '. Borehole<br>oils, 10-3-86 | i.      | radioac                     | tive<br>ination and        |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         | by Eber                     | nma-logged<br>line-TMA,    |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         | Corp.<br>No grou<br>observe | ind water                  |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         | Observe                     | u.                         |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            | 1                                         |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             | 1                                                                                                |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             | l                                                                                                |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             | l          | . ·                                       | ĺ           |                                                                                                  |              |               |          |                  |        | 2                                           |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           | ļ           |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         | Descrip                     | tion and                   |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          | 1                |        |                                             |                          |                              |         | samples                     | ation of soil<br>by visual |
|   |                                               |             |            |                                           |             |                                                                                                  |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   | 1                                             |             |            |                                           |             | ļ                                                                                                |              |               |          |                  |        |                                             |                          |                              |         |                             |                            |
|   | L                                             | ļ           |            |                                           |             | L                                                                                                | <u> </u>     | ļ             | <u> </u> |                  |        |                                             | <u></u>                  | ·                            |         |                             |                            |
|   |                                               |             |            | POON; S1                                  |             |                                                                                                  | ,            | ITE           |          | 1                | 11     | Branca Ct.                                  |                          |                              |         | HOLE NO                     | ).<br>896R                 |
|   | <b>۲</b> ــــــــــــــــــــــــــــــــــــ | DENN        | 1301       | ; P = PI                                  | UUNEK;      | v ≠ l                                                                                            | THEK         |               |          | 2                |        |                                             |                          |                              | ١       | · ·                         | /30IN                      |

Sec. 1

| Γ                     |           | C                      |           |                     |            | DRIL              |              |          | PROJE  | СТ       |                                             | JOB NO                                     |                    | ET NO.                           | HOLE NO.                           |
|-----------------------|-----------|------------------------|-----------|---------------------|------------|-------------------|--------------|----------|--------|----------|---------------------------------------------|--------------------------------------------|--------------------|----------------------------------|------------------------------------|
| si                    | TE        |                        |           |                     |            | DAIL              |              | COORDIN  | ATES   |          | FUSRAP                                      |                                            | -138 1<br>ANGLE FR |                                  | 397R<br>BEARING                    |
|                       |           |                        |           |                     |            | LODI              |              |          | 1      |          | N 2141; E 3581                              |                                            | Vert               | ical                             |                                    |
| 1                     | :GU<br>0- |                        |           | DMPLETE             |            | LLER              | RETR         | ENCH     |        |          | MAKE AND NODEL SI<br>S little beaver        | ZE OVERBURDEN<br>4" 9.0                    | ROCK               | (FT.)                            | TOTAL DEPT<br>9.0                  |
|                       |           |                        |           |                     |            |                   |              | ESEL. TO | PCAS   |          | GROUND EL. DEPTH/EL                         | . GROUND WATER<br>5.9 10-3-86              | DEPTH,             | EL. TOP                          |                                    |
| SA                    | MP        | LE H                   | /<br>AMME | R WEIGH             | IT/FALI    |                   | J<br>SING LE | FT IN HO | LE: DI | A./L     | 43.4 1.575                                  |                                            |                    | /                                |                                    |
|                       | <u> </u>  |                        |           | N/A                 |            |                   |              | NO       |        |          |                                             | D. MCG                                     | RANE               |                                  |                                    |
| ДE<br>Д               | ۱.<br>چ   | SAMP. ADU.<br>LEN CORE |           | BLOWS "N"<br>* CORE | <u>}</u> ₹ | WATER             | RE           |          | _      | ន        |                                             |                                            |                    |                                  |                                    |
|                       | Ĭ         | ¶0<br>₽                |           | 1450<br>100<br>100  | ມ<br>20 ຫ  |                   |              | ELEV.    | DEPTH  | GRAPHICS | DESCRIPTION A                               | ND CLASSIFIC                               |                    |                                  | LEVELS,                            |
| P<br>M<br>P<br>M<br>P |           | 튄                      | AMPL      | °,0<br>N            |            | G.P.<br>PRES      | HINE<br>MIN. |          | ö      | GRA      | ĥ                                           |                                            |                    | CHARAC                           | RETURN,                            |
| 5                     |           | ທ                      | <u>6</u>  |                     |            |                   |              | 43.4     |        |          | 0.0 - 9.0 FT. SILTY<br>and natural mater    | SAND (SM-SC).                              | Fill               | Borehole                         | NG, ETC.<br>drilled 0 -            |
|                       |           |                        |           |                     |            |                   |              |          | -      |          | fine to medium gr                           | ained; soft; poorly<br>e); moist - saturat |                    | 9.0 ft. us<br>solid-ste          | sing 4"<br>em augers.              |
|                       |           |                        |           | -                   |            |                   |              |          |        |          | 7.5 ft.<br>0.0-4.5 FT., mode                | rate brown, (5 YR                          |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          | .      |          | few organics.                               |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          | 5_     |          | 4.5-6.5 FT., clayer<br>(N2) with a few pa   | y (SC); grayish bls<br>ale green (5 G 7/2) | .ck                | Site chea                        | ked for                            |
|                       |           |                        |           |                     |            |                   |              |          | -      |          |                                             | ale green (5 G 7/2)<br>sediments?.         |                    |                                  | nation and                         |
|                       |           |                        |           |                     |            |                   |              | Ž        |        |          | dark reddish brow                           | ed moderate brown<br>n (10 R 3/4).         | and                | by Eberl<br>Corp.                | nma-logged<br>line-TMA,            |
|                       |           |                        |           |                     |            |                   |              | 34.4_    |        |          |                                             |                                            |                    | Ground                           | water<br>1 <b>, 10-3-8</b> 6.      |
|                       |           |                        |           |                     |            |                   |              |          |        |          | Bottom of boring at a<br>backfilled with au | 9.0 FT. Borehole                           |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          | Dackinicu wivii au                          | ger spons, 10-5-60.                        |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            | r<br>I            |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          | 2                                           |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           | 1                      |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          | С. С    |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
| 1                     |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    | Descripti                        | ion and                            |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    | classifica<br>samples<br>examina | tion of soil<br>by visual<br>tion. |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           |                        |           |                     |            |                   |              |          |        |          |                                             |                                            |                    |                                  |                                    |
|                       |           | SPI 1                  | T er      |                     | <br>T = °" | IELBY TU          | RF- ISI      | ITE      |        |          | <u> </u>                                    |                                            |                    | HOLE NO.                         |                                    |
|                       |           |                        |           |                     |            | $\frac{1}{2} = 0$ |              |          |        | 1        | l Branca Ct. L                              | ODI                                        | ١                  |                                  | 97R                                |
| _                     |           |                        |           |                     |            |                   |              |          |        |          | A-9                                         |                                            |                    |                                  |                                    |

.....

| 1  |                         |             |            |                                                                                             |        |          |                  |              |                | PROJEC | T        |        |                  |                                                               |                      |                    | JOB NO.                                      | .  s           | HEET NO. | HOLE NO                       | ).   |
|----|-------------------------|-------------|------------|---------------------------------------------------------------------------------------------|--------|----------|------------------|--------------|----------------|--------|----------|--------|------------------|---------------------------------------------------------------|----------------------|--------------------|----------------------------------------------|----------------|----------|-------------------------------|------|
|    |                         | C           | <b>JEC</b> | )LO(                                                                                        | GIC    |          | RILI             | LLO          | G              |        |          |        | FUS              | RAP                                                           |                      |                    | 4501                                         |                |          |                               |      |
| ľ  | SITE                    |             |            | _                                                                                           |        |          |                  |              | COORDIN        | ATES   |          |        |                  |                                                               |                      |                    | -                                            |                |          | 12BEARING                     |      |
| l  |                         |             |            | Branc                                                                                       |        |          |                  |              | <u> </u>       |        | ND TI J  |        | 2147;<br>E AND M | E 3619                                                        | SIZE                 |                    | RBURDEN                                      |                | ertical  | TOTAL D                       |      |
| 1  | BEGL<br>10-             |             | - F        | 0-3-                                                                                        |        | DKILL    |                  | RETR         | ENCH           | ſ      |          |        | ittle b          |                                                               | 312E<br>4"           | OVE                | 9.0                                          |                | OUK (FI. | 9.0                           |      |
|    |                         |             |            |                                                                                             |        | CORE     |                  |              | ESEL. TO       | P CASI |          |        | ID EL.           |                                                               | /EL GR0<br>0/34.7    |                    |                                              | DEP            | TH/EL. T | OP OF ROCK                    | _    |
|    |                         |             | _/         |                                                                                             |        | <u> </u> |                  |              |                |        |          |        | <b>11.7</b>      | <b>I</b> ¥_/                                                  |                      | 10-3-6             |                                              |                |          | 1                             |      |
| f  | SAMP                    | PLE 1       |            | r weig<br>N/A                                                                               | H17F   | ALL      | CAS              | SING LE      | FT IN HO<br>NO |        | A./L     | ENGI   | LOGG             | ED BY:                                                        |                      | D.                 | MCGI                                         | RANI           | F.       |                               |      |
|    | Ш.                      | •1          | 1.         |                                                                                             | Т      |          | JATER            | ₹            |                |        |          |        | _1               |                                                               |                      |                    |                                              |                | <u> </u> |                               |      |
|    | SAMP. TYPE<br>AND DIAM. |             |            | SAMPLE<br>SAMPLE<br>BLOWS "N"<br>% CORE                                                     | i<br>L | PRI      | ESSU             | RE<br>5      |                | Ŧ      | BRAPHICS | ш      |                  |                                                               |                      |                    |                                              |                |          | S ON:                         |      |
|    |                         |             | Ш<br>Ш     | L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L<br>L |        | , Σ      | s.<br>I.         | ш.           | ELEV.          | DEPTH  | I        | SAMPLE | DESCR            | IPTION                                                        | N AND                | CLAS               | SIFIC                                        | ATIO           |          | R LEVEL                       |      |
|    | 盟                       |             | ΔÖ         | ₩ <u>₹</u>                                                                                  |        | E N. G   | PRESS.<br>P.S.I. | HINE<br>MIN. |                | ā      | - HO     | S      |                  |                                                               |                      |                    |                                              |                | CHAP     | ACTER O                       | F    |
|    | ğ⊄                      | <u>ଜ</u> ା- |            |                                                                                             |        |          | äa.              |              | 41.7           | ļ      |          |        | 0-00             | FT. <u>SIL</u>                                                | TYSAN                | ID 7SN             | 4-SC)                                        | Fill           |          | LING, E                       |      |
|    |                         |             |            | 1                                                                                           |        |          |                  |              |                | ] .    |          | ľ      | and n            | atural ma<br>o medium                                         | aterial:             | color s            | tratified                                    | :              | 9.0 ft   | . using 4"<br>-stem auger     |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                | .      |          |        | (loose           | ); moist<br>5 FT., m                                          | - satura             | ited at            | 7.0 ft.                                      |                | sond     | stem auger                    | э.   |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        | Nume             | rous root                                                     | s and or             | ganics             | , (8 IR                                      | 3/4).<br>D0/4) |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  | ]            |                |        |          |        | 0.5-2.<br>2.0-4. | 0 FT., di<br>0 FT., cl                                        | ayey (S              | ish bro<br>C); gra | ayish bla                                    | n 3/4)<br>ack  | •        |                               |      |
|    |                         |             |            | ĺ                                                                                           |        |          |                  |              |                | 5_     |          |        | (N2);<br>4.0-4.  | rous root<br>0 FT., da<br>0 FT., cl<br>floodplai<br>5 FT., pa | n seaim<br>ale green | (5 G)              | 7/2); cl                                     | ayey           |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                | .      |          |        | 4.5-5.           | floodplai<br>0 FT., di                                        |                      |                    |                                              |                | radic    | checked for<br>active         |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                | ¥ .    |          |        | 4/2).<br>5.0-9.  | .0 FT., m<br>reddish b                                        | ottled n             | nodera             | te browr                                     | n and          | hole     | mination as<br>gamma-logg     | ged  |
|    |                         |             |            |                                                                                             |        |          |                  |              |                | Ĩ.     |          |        | dark i           | reddish b                                                     | rown.                |                    |                                              |                | Corp     |                               | А,   |
|    |                         |             |            |                                                                                             |        |          |                  |              | 32.7_          |        |          |        |                  |                                                               |                      |                    | <u>.                                    </u> |                |          | nd water<br>ved, 10-3-8       | 86.  |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          | E      | ottom g          | of boring<br>illed with                                       | at 9.0 F             | T. Bo              | rehole                                       |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        | Dacki            | illed with                                                    | i auger s            | polis,             | 10-3-80                                      | •              |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
| _  |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              | <u> </u>       |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
| 1  |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             | 1          |                                                                                             |        | l        |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  | 1            | 1              | 1      |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                | 1      |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         | 1           | 1          |                                                                                             |        |          |                  |              |                | 1      |          |        |                  |                                                               |                      |                    |                                              |                | 1        |                               |      |
|    |                         |             |            |                                                                                             |        |          | ł                |              | ]              | 1      |          |        |                  |                                                               |                      |                    |                                              |                | [        |                               |      |
|    |                         | 1           |            |                                                                                             |        |          |                  |              |                | 1      |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          | l                |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         | l           |            |                                                                                             |        |          |                  | 1            | l              |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    | Į.                      |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                | Desc     | ription and<br>ification of s | soil |
| .1 | 1                       |             |            |                                                                                             |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                | sam      | les by visua                  | ы    |
|    |                         |             |            | 1                                                                                           |        |          |                  |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         | {           |            |                                                                                             |        |          |                  | l            |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            |                                                                                             |        |          | l                |              |                |        |          |        |                  |                                                               |                      |                    |                                              |                |          |                               |      |
|    |                         |             |            | SPOON;                                                                                      |        |          |                  |              | SITE           |        |          |        |                  |                                                               | 10                   |                    |                                              |                | HOLE     |                               |      |
|    | D ≖                     | DEN         | NISON      | l; P =                                                                                      | PIT    | CHER;    | 0 = (            | DTHER        |                | _      | 1        |        |                  | ca Ct                                                         | . LUI                |                    | <u> </u>                                     | `              |          | 398R                          |      |
|    |                         |             |            |                                                                                             |        |          |                  |              |                |        |          | Δ-     | 10               |                                                               |                      |                    |                                              |                |          |                               |      |

|      |            | C         |                       | DLOG                                      |         | DII   |         |              | PROJE  | ст       | ·····                                                                                                 |                                                                                                                                    | JOB NO                                                                                                                                                                    | ). SHE                                             | ET NO.                                                                                                                           | HOLE NO.                                                                         |
|------|------------|-----------|-----------------------|-------------------------------------------|---------|-------|---------|--------------|--------|----------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|      | SIT        |           |                       | 100                                       |         | TIL   |         | COORDIN      | ATES   |          | FUSRAP                                                                                                |                                                                                                                                    |                                                                                                                                                                           | -138 1                                             | OF 1                                                                                                                             | 399R                                                                             |
|      |            |           | 11]                   | Branca                                    | Ct. L   | ODI   |         |              |        |          | N 2121; E 36                                                                                          | 19                                                                                                                                 |                                                                                                                                                                           |                                                    | tical                                                                                                                            |                                                                                  |
|      | BEGL       |           |                       | OMPLETED                                  |         |       |         |              | F      |          | NAKE AND HODEL                                                                                        | SIZE                                                                                                                               | OVERBURDEN                                                                                                                                                                | ROCI                                               | ( (FT.)                                                                                                                          | TOTAL DEPTH                                                                      |
| ~~~~ |            |           |                       | 0-3-8                                     |         |       |         | ENCH         | P CASI |          | <b>S little beave</b><br>GROUND EL. DEF                                                               |                                                                                                                                    | 9.0 ROUND WATER                                                                                                                                                           | DEPTH                                              | /EL. TOP                                                                                                                         | 9.0                                                                              |
|      |            |           |                       |                                           |         |       |         |              |        |          | 41.4                                                                                                  | 8.0/33.4<br>/                                                                                                                      | 10-3-86                                                                                                                                                                   |                                                    |                                                                                                                                  |                                                                                  |
|      | ISAMF      | PLE H     |                       | RWEIGHT<br>N/A                            | FALL    | CAS   | SING LE | FT IN HO     |        | A./LI    | ENGTH LOGGED BY:                                                                                      | :                                                                                                                                  | D. MCG                                                                                                                                                                    | RANE                                               |                                                                                                                                  |                                                                                  |
|      | ш.         | <u>اد</u> |                       |                                           |         | JATER |         |              |        | m        |                                                                                                       |                                                                                                                                    | D. MCO                                                                                                                                                                    | MAILE                                              | <u> </u>                                                                                                                         |                                                                                  |
|      | SAMP. TYPE | SAMP. AD  | SAMPLE RE<br>CORE REC | SAMPLE<br>BLOWS "N"<br>X CORE<br>RECOVERY | G. P. M | TESTS |         | ELEV.        | DEPTH  | GRAPHICS |                                                                                                       |                                                                                                                                    | CLASSIFIC                                                                                                                                                                 |                                                    | WATER<br>CHARAC                                                                                                                  | ON:<br>LEVELS,<br>Return,<br>Ter of<br>Ng, etc.                                  |
|      |            |           |                       |                                           |         |       |         | 41.4<br>32.4 |        |          | (loose); mo<br>0.0-0.5 FT.<br>Numerous r<br>0.5-2.0 FT.<br>2.0-4.0 FT.<br>(N2); floodr<br>4.0-4.5 FT. | um; soft;<br>ist - satu;<br>moderat<br>oots and (<br>, dark red<br>lain sedir<br>, gray (NS<br>T., motti<br>N brown, a<br>/R 4/2). | poorly consoli<br>rated at 8.0 ft.<br>e brown, (5 YR<br>organics.<br>dish brown (10<br>SC); grayish bl<br>nents?<br>.); clayey (SC).<br>ed moderate br<br>and dark yellow | dated<br>3/4).<br>R 3/4).<br>ack<br>own and<br>ish | Borehole<br>9.0 ft. un<br>solid-ste<br>Site cheer<br>radioact<br>contamin<br>hole gam<br>by Eberl<br>Corp.<br>Ground<br>observed | cked for<br>ive<br>nation and<br>ima-logged<br>line-TMA,<br>water<br>1, 10-3-86. |
|      |            |           |                       | POON; ST<br>P = PI                        |         |       |         | TE           |        |          | 1 Branca C                                                                                            | t. LO                                                                                                                              | DI                                                                                                                                                                        | λ                                                  | HOLE NO.                                                                                                                         | 99R                                                                              |

**``**~

|                                        |              | ~                      | -                                                                                           |                                           |                       | DHI                                                                                              |              | <u> </u> |                 |           |            |                    | NO.                         | T NO.                                               | HOLE NO.           |                          |      |                       |                                       |
|----------------------------------------|--------------|------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------|--------------|----------|-----------------|-----------|------------|--------------------|-----------------------------|-----------------------------------------------------|--------------------|--------------------------|------|-----------------------|---------------------------------------|
|                                        | SITE         |                        |                                                                                             | LOG                                       |                       |                                                                                                  |              |          | G FUSRAP        |           |            |                    |                             |                                                     |                    | 14501-138 1<br>ANGLE FRO |      |                       | 400R                                  |
|                                        | 3116         |                        | 1 B                                                                                         | ranca (                                   | Ct. (L                | ווסס                                                                                             |              | COORDIN  | N 2113; E 3597  |           |            |                    |                             |                                                     |                    |                          | vert |                       | BEAKING                               |
|                                        | BEGU         | IN                     | CC                                                                                          | MPLETED                                   | DRILL                 |                                                                                                  |              |          |                 | DRIL      |            | E AND M            |                             | SIZE                                                | OVERBUR            |                          | 1    | (FT.)                 | TOTAL DEPTH                           |
| ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ |              |                        |                                                                                             | 0-6-8                                     |                       |                                                                                                  |              | ENCH     |                 |           |            | ittle E            |                             | 4"                                                  | -                  | .0                       |      |                       | 9.0                                   |
|                                        | CORE         | REC                    | OVER                                                                                        | 1 (11./7                                  | CORE                  | BOXES                                                                                            | SISAMPL      | ESEL. TO | P CAS           | ING       |            | ID EL.             | DEPTH/                      | 'EL. GROU<br>)/34.3 10                              | ND WATEI<br>1-6-86 | R D                      | EPTH | EL. TOP               | OF ROCK                               |
|                                        | SAMP         | LEH                    | AMHE                                                                                        | R WEIGHT                                  | /FALL                 | CAS                                                                                              | ING LE       | FT IN HO | E: DI           | A./L      |            |                    | D BY:                       |                                                     |                    | l                        |      | /                     |                                       |
|                                        |              |                        |                                                                                             | N/A                                       | ,                     |                                                                                                  |              | NO       | NONE D. McGRANE |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        | DIAM.        | Σw                     |                                                                                             | SAMPLE<br>BLOWS "N"<br>% CORE<br>RECOVERY | PR                    | JATER<br>ESSUI                                                                                   | RE           |          |                 | _   g   ] |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        | <b>T</b> AIC | SAMP. ADU.<br>LEN CORE |                                                                                             |                                           |                       | ESTS                                                                                             |              | ELEV.    | DEPTH           | BRAPHICS  | SAMPLE     | DESCR              | IPTION                      | AND C                                               | LASSIF             | ICATI                    | ON   | WATER                 | ON:<br>Levels,                        |
|                                        | ê.           | <u>e</u> Z             |                                                                                             |                                           | LOSS<br>LOSS<br>G.P.M | S. I.                                                                                            | TIME<br>MIN. |          | Ē               | Ц.        | SAP        |                    |                             |                                                     |                    |                          |      | WATER                 | RETURN,<br>TER OF                     |
|                                        | SAMP         |                        | N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N<br>N |                                           | <del>ی</del> ۔        | Р<br>Н<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С<br>С | F.5          | 42.3     |                 | 0         | []         |                    |                             |                                                     |                    |                          |      |                       | NG, ETC.                              |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           | 0          | 0-9.0 ft<br>and na | . <u>SILTY</u><br>atural ma | SAND (S.<br>terial; fin                             | M-SC). 1<br>e-to   | Fill                     |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            | madin              | m-resine                    | d entre                                             | ooply con          | adidata                  | d    | Borehole              | it. using 4"                          |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          | -               |           |            | 0.0-4<br>mottle    | .5 ft. moo<br>d dark re     | aturated<br>derate bro<br>eddish bro<br>nics; grass | wn (5YH<br>wn (10R | 3/4);<br>3/4);           |      |                       | m augers.                             |
|                                        |              |                        |                                                                                             |                                           |                       | 1                                                                                                |              |          | -               |           |            | IL.]; IE           | ous organ<br>w pebble       | nics; grass<br>s of vario                           | us litholo         | 0.0-0.5<br>ogies;        |      | Site cheo<br>radioact | ive ]                                 |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          | 5_              |           |            | fill?<br>4.5-6     | .0 ft. gray                 | yish black<br>ded pebbl                             | (N2); cla          | ayey                     |      | hole gan              | nation and<br>nma-logged<br>line-TMA, |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          | -               |           |            | sedime             | ents?                       | tled mod                                            |                    |                          |      | Corpora               |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          | -               |           |            |                    | eddish br                   |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              | L<br>L   | Į.              |           |            |                    |                             |                                                     |                    |                          |      | 8.0 ft. gr            | ound water                            |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              | 33.3_    | -               |           |            |                    |                             |                                                     |                    |                          |      | observed              | l.                                    |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            | were is            | mmediate                    | e at 9.0 ft<br>ly placed                            | in the h           | spoils<br>ole,           |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            | 10-7-8             | 56.                         |                                                     |                    |                          |      |                       |                                       |
| ~                                      |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        | •                                                                                           |                                           |                       | ĺ                                                                                                |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          | •               |           |            |                    |                             |                                                     |                    |                          |      | -                     |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       | 1                                                                                                |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       | -                                     |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          | ,    |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          | ĺ    |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     | ,                  |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          | :    |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          | 1               |           |            |                    |                             |                                                     |                    |                          |      | Descript              | ion and                               |
| 1                                      |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      | classifica<br>samples | tion of soil<br>by visual             |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      | examina               |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            | •                  |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             |                                           |                       |                                                                                                  |              |          |                 |           |            |                    |                             |                                                     |                    |                          |      |                       |                                       |
|                                        |              |                        |                                                                                             | POON; ST                                  |                       |                                                                                                  |              | ITE      |                 | <br>      |            |                    | <u> </u>                    | (1 0 0                                              | <br>r`\            |                          |      | HOLE NO.              |                                       |
|                                        | 0 =          | DENN                   | ISON                                                                                        | P = PI                                    | TCHER;                | 0 = 0                                                                                            | THER         |          |                 | 11        | <u></u> ⊿- |                    | I LT.                       | (LOD                                                | l)                 | ````                     |      | 4                     | 00R                                   |

• · · · •

----

|                         | G                      | EC               | DLO                           | GIC        | CD                    | RIL              | L LC              | G               | PROJE |            | FUSRAP                               | 4501                                                                     | -138            | 1 OF 1              | HOLE NO.<br>506R         |
|-------------------------|------------------------|------------------|-------------------------------|------------|-----------------------|------------------|-------------------|-----------------|-------|------------|--------------------------------------|--------------------------------------------------------------------------|-----------------|---------------------|--------------------------|
| SITE                    |                        | _                |                               | ~          |                       |                  |                   | COORDIN         | ATES  |            |                                      |                                                                          |                 | ROM HORIZ           | BEARING                  |
| BEGU                    | _                      |                  | MPLET                         |            |                       |                  | l)                |                 |       | NPTII      | N 2169; E 3541<br>MAKE AND MODEL     | SIZE OVERBURDEN                                                          |                 | rtical<br>CK (FT.)  | TOTAL DE                 |
|                         |                        |                  | )-31-                         |            |                       |                  | RETE              | RENCH           |       |            | Mobile B-33                          | 6" 11.0                                                                  |                 | 3.0                 | 14.0                     |
|                         |                        |                  |                               |            |                       | BOXE             | SSAMPL            | ESEL. TO        | P CAS | ING        | ROUND EL. DEPTH/                     | EL. GROUND WATER<br>/36.5 10-31-86                                       | DEPT            | H/EL. TOP           | OF ROCK                  |
|                         |                        | _/               |                               |            |                       |                  |                   |                 |       |            | 44.0 🗶 /                             | /30.5 10-31-00                                                           |                 | 11.0/               | 33.0                     |
| SAMP                    | LEH                    |                  | R WEIG                        | HT/        | FALL                  | CAS              | SING LE           | EFT IN HO<br>NO |       | (A./L      | NGTH LOGGED BY:                      | D. McGl                                                                  | DANE            |                     |                          |
| шI                      | +1                     | 1                | N/A                           | T          | i                     | JATE             | २                 | <u></u>         |       |            | <b>!</b>                             | D. McGi                                                                  | ANE             | - <u>_</u>          |                          |
| SAMP. TYPE<br>AND DIAM. | SAMP. ADU.<br>LEN CORE | ぼし.              | SAMPLE<br>BLOUS "N"<br>X CORE | ¥.         | PR                    | ESSU             | RE                |                 | т     | GRAPHICS   | 4                                    |                                                                          |                 | NOTES               | ON:                      |
| 1                       | <u> </u>               | SAMPLE<br>CORE R | μ<br>Π<br>Π<br>Π<br>Π<br>Π    |            | ω Σ                   | ற்ப              | ш.                | ELEV.           | DEPTH | RAPHIC     | DESCRIPTION                          | AND CLASSIFIC                                                            | ATION           |                     | RETURN                   |
| 毀                       | D N N                  | MPI<br>BRO       | ж <u>г</u> м                  | Ω,         | LOSS<br>IN<br>G. P. M | PRESS.<br>P.S.I. | HIN<br>HIN<br>NIN | 1               | õ     | <b>BRA</b> |                                      |                                                                          |                 | CHARA               | CTER OF                  |
| გ₫                      | 2                      | Ğ Ö              | ίΩ΄                           | -          |                       | <u>Ľ.</u>        |                   | 44.0            | <br>  |            | 0.0-11.0 ft. SILTY                   | CAND (SM) E:                                                             |                 | DRILL               | ING, ET                  |
| ŗ                       |                        |                  |                               |            |                       |                  |                   |                 |       |            | (0.0-6.5 ft.) and                    | indigenous material                                                      |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            | (6.5-14.0 ft.); co<br>medium-grained | olor stratified; fine-to<br>d; with few-numerous                         | )<br>5 pieces - | 0.0-14.0            | e drilled<br>ft. using   |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            | cobble) of varia                     | d; with few-numerous<br>alar gravel (and occas<br>ous lithologies in the | sional<br>fill  |                     | stem auge                |
|                         |                        |                  |                               |            |                       |                  |                   |                 | 1     |            | material; soft; u<br>sometimes claye | nconsolidated (loose)<br>ey (SC-OH); moist-se                            | ;<br>aturated   | Site che<br>radioac | cked for<br>tive         |
|                         |                        |                  |                               |            |                       |                  |                   |                 | 5.    | T  [       | at 7.5 ft.                           | lerate brown (5YR3/                                                      |                 | contam              | ination an<br>mma-logg   |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       | 1          | numerous grass                       | roots and organics.<br>reddish brown; grav                               |                 | by Eber<br>Corport  | mma-logg<br>rline-TMA    |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       | 1          | (0.3-3.5 ft.).                       |                                                                          | •               | Jorpon              |                          |
| [                       |                        |                  |                               |            |                       |                  |                   |                 | ¥     | 1          | numerous organ                       | vish black (N2); claye<br>lics; stream sediments                         | 8?              | 754 -               | round wat                |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            | 8.0-11.0 ft. day                     | rk yellowish brown                                                       |                 | observe             |                          |
| 1                       |                        |                  |                               |            |                       |                  |                   |                 |       | -          | (101R4/2); dec                       | omposed sandstone?                                                       |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 | 10.   |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   | 33.0_           | 1     | -          | 11.0-14.0 ft. SANE                   | STONE. Dark reddi                                                        | ish             | -                   |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       | -          | brown (10R3/4)<br>(argillaceous); s  | ); fine grained<br>oft-moderately hard.                                  |                 |                     |                          |
|                         |                        |                  |                               | 1          |                       |                  |                   |                 |       |            |                                      |                                                                          |                 | 1                   |                          |
|                         |                        |                  |                               |            |                       |                  |                   | 30.0            | 1     | +          |                                      | · · · ·                                                                  |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            | Bottom of borehole<br>were immediate | e at 14.0 ft. Auger spe<br>ly replaced in the hol                        | oils<br>le.     |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            | 10-31-86.                            |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            | :                     |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               | Í          |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  | ł                             |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       | ł                |                   |                 | ł     |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 | {     | ·          |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  | l                             |            |                       |                  | 1                 |                 | 1     |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  | 1                 | 1               | 1     |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  | l                             |            |                       | 1                |                   |                 | 1     |            | •                                    |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 | Descrip             | tion and                 |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 | classific           | ation of so<br>by visual |
|                         |                        |                  | ļ                             |            |                       | ł                |                   |                 |       |            |                                      |                                                                          |                 | examin              |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  |                               |            |                       |                  |                   |                 |       |            |                                      |                                                                          |                 |                     |                          |
|                         |                        |                  | P00N;                         |            | - 605                 |                  |                   |                 | 1     | 1          |                                      |                                                                          |                 | HOLE NO             | ).<br>                   |
| SS ≈                    |                        |                  |                               | <b>S</b> I |                       | ым∀ <b>Т</b>     | UKE - 19          |                 |       |            |                                      | : (LODI)                                                                 |                 | 10066 80            |                          |

|                    | 0                      | GE     | ol       | .0        | G                | C            | D                 | RIL                | .L         | LO    | )G         |            | PROJ   | ECT      |    | FUSRAP                                                                                                                                                                                                                     |                                       |                                                                                      |                                          | JOB NO                                                |                       |       | ET NO.<br>OF 1                                                                                           | HOLE NO                                                                   |
|--------------------|------------------------|--------|----------|-----------|------------------|--------------|-------------------|--------------------|------------|-------|------------|------------|--------|----------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------|-------------------------------------------------------|-----------------------|-------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| SIT                | -                      |        |          |           |                  |              |                   |                    |            |       | <b>C00</b> | RDIN       | ATES   | <u> </u> |    |                                                                                                                                                                                                                            |                                       |                                                                                      | · · · ·                                  |                                                       |                       |       | OM HORIZ                                                                                                 |                                                                           |
| BEGL               |                        |        |          |           |                  |              |                   |                    | <b>I</b> ) |       | <u> </u>   |            |        | -        |    | N 2105; E 3543                                                                                                                                                                                                             | ·                                     |                                                                                      | 1                                        |                                                       |                       | Vert  |                                                                                                          |                                                                           |
|                    | л<br>31-               |        |          |           |                  |              | JLL               |                    | R          | ETR   | EN         | СН         |        | IURI     |    | MAKE AND MODEL<br>Mobile B-33                                                                                                                                                                                              | s                                     | 12E<br>6"                                                                            | OVE                                      | RBURDEN 10.0                                          |                       | ROCK  | (FT.)                                                                                                    | TOTAL                                                                     |
|                    |                        |        |          |           |                  |              | ORE               |                    |            |       |            |            | OP CAS | SING     |    | ROUND EL. DEPTH                                                                                                                                                                                                            | I/EI<br>.5/.                          | L. GROU                                                                              | ND W                                     | ATER                                                  | P                     | EPTH/ | /EL. TOP                                                                                                 |                                                                           |
| SAMF               | PLE                    | IAMM   |          | WEI<br>/A | GHT,             | /FA          | LL                | CA                 | SIN        | IG LE |            | n ho<br>NO |        | IA./     | LE | NGTH LOGGED BY:                                                                                                                                                                                                            |                                       | ·····                                                                                | D.                                       | McGl                                                  | L.<br>RAN             | NE.   | /                                                                                                        |                                                                           |
| DIAM.              | SAMP. ADU.<br>LEN CORE | E REC. | <u> </u> |           |                  | <del>ຫ</del> | PR<br>T           | ATE<br>ESSL<br>EST | JRE<br>S   |       | EL         |            | DEPTH  | GRAPHICS |    | DESCRIPTION                                                                                                                                                                                                                | N                                     | AND CI                                                                               |                                          |                                                       |                       | ON    | NOTES                                                                                                    | LEVEL                                                                     |
| SAMP<br>BND<br>BND | SAMP                   | BAMP   | N N N    |           | R<br>R<br>R<br>C |              | . Ч. С<br>М. Ч. С | PRES<br>P.S.       | TIM        | MIN.  |            | 44.7       | ā      | GRA      | 22 |                                                                                                                                                                                                                            |                                       |                                                                                      |                                          |                                                       |                       |       | WATER<br>CHARAC<br>DRILLI                                                                                | TER C                                                                     |
|                    |                        |        |          |           |                  |              |                   |                    |            |       |            |            | 5      |          |    | 0.0-10.0 ft. SILT<br>(0.0-4.0 ft.) an<br>material(4.0-1<br>fine-to mediun<br>few-numerous<br>gravel (and occ<br>lithologies in t<br>unconsolidated<br>(SC-OH); moii<br>0.0-0.3 ft. mo<br>numerous grass<br>0.3-4.0 ft. dan | n-i<br>pi<br>cas<br>he<br>d (l<br>st- | grained;<br>eces of r<br>hional co<br>fill mate<br>cose); so<br>saturate<br>rate bro | ound<br>obble<br>erial;<br>omet<br>ed at | led ang<br>) of vas<br>; soft;<br>imes cla<br>7.5 ft. | ular<br>rious<br>ayey | 1     | Borehole<br>0.0-10.0<br>hollow-1<br>Site chee<br>radioact<br>contamii<br>hole gan<br>by Eberl<br>Corpora | ft. usin<br>stem aug<br>cked for<br>ive<br>nation a<br>nma-log<br>line-TM |
|                    | •                      |        |          |           |                  |              |                   |                    |            |       |            | 54.7_      | 10     |          |    | numerous grass<br>0.3-4.0 ft. dat<br>4.0-6.0 ft. m<br>mottled grayis<br>sediments and<br>6.0-10.0 ft. di<br>(10YR4/2); de                                                                                                  | bu<br>bu<br>ark<br>cor                | plack (N<br>iried up)<br>yellowi<br>mposed                                           | 2); n<br>per i<br>sh bi<br>sand          | stone?                                                | ream<br>izon?         |       | 7.5 ft. gr<br>observed                                                                                   | ound w<br>l.                                                              |
|                    |                        |        |          |           |                  |              | -                 |                    |            |       |            |            |        |          |    | Bottom of boreho<br>were immediat<br>10-31-86.                                                                                                                                                                             | ole i<br>tely                         | at 10.0 f<br>replace                                                                 | ft. An<br>ed in                          | uger spo<br>the hol                                   | oils<br>e,            |       |                                                                                                          |                                                                           |
|                    |                        |        |          |           |                  |              |                   |                    |            |       |            |            |        |          |    |                                                                                                                                                                                                                            |                                       |                                                                                      |                                          |                                                       |                       |       |                                                                                                          |                                                                           |
|                    |                        |        |          |           |                  |              |                   |                    |            |       |            |            |        |          |    |                                                                                                                                                                                                                            |                                       |                                                                                      |                                          |                                                       |                       |       |                                                                                                          |                                                                           |
|                    |                        |        |          |           |                  |              |                   |                    |            |       |            |            |        |          |    |                                                                                                                                                                                                                            |                                       |                                                                                      |                                          |                                                       |                       |       |                                                                                                          |                                                                           |
|                    |                        |        |          |           |                  |              |                   |                    |            |       |            |            |        |          |    |                                                                                                                                                                                                                            |                                       |                                                                                      |                                          |                                                       |                       |       |                                                                                                          |                                                                           |
|                    |                        |        |          |           |                  |              |                   |                    |            |       |            |            |        |          |    |                                                                                                                                                                                                                            |                                       |                                                                                      |                                          |                                                       |                       |       |                                                                                                          |                                                                           |
|                    | :                      |        |          |           |                  |              |                   |                    |            |       |            |            |        |          |    |                                                                                                                                                                                                                            |                                       |                                                                                      |                                          |                                                       |                       |       | Descripti<br>classifica<br>samples<br>examinat                                                           | tion of<br>by visu:                                                       |
|                    |                        |        |          |           |                  |              |                   | BY TL              |            |       | ITE        |            |        |          |    |                                                                                                                                                                                                                            |                                       |                                                                                      |                                          |                                                       |                       |       | HOLE NO.                                                                                                 |                                                                           |
| =                  | DENN                   | 150    | i; f     |           | PIT              | CHE          | R;                | 0 = (              | DTH        | ER    |            |            |        | 11       | _  | Branca Court<br>A-14                                                                                                                                                                                                       | Ľ                                     | LUL                                                                                  | <u>기)</u>                                | <u> </u>                                              | ١                     |       | 5                                                                                                        | <u>07R</u>                                                                |

|                         |                                        | G        | EC                       | )L(                 | DG                 | IC D                    | RIL   | LLO      | G         | PROJE       | CT       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | JOB NO. SHEET NO. HOLE N<br>14501-138 1 OF 1 61(             |                                                                                |  |  |  |
|-------------------------|----------------------------------------|----------|--------------------------|---------------------|--------------------|-------------------------|-------|----------|-----------|-------------|----------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------|--|--|--|
| SITI                    | ITE COORDINA<br>11 Branca Court (LODI) |          |                          |                     |                    |                         |       |          |           |             |          |               | ANGLE FR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ANGLE FROM HORIZBEARING                                      |                                                                                |  |  |  |
| BEGI                    |                                        | 1        |                          |                     |                    | Durt ()<br>DRILI        |       | l)       |           |             | DRIL     |               | N 2093; E 3611 Vert                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                              | TOTAL DEPTH                                                                    |  |  |  |
|                         |                                        |          | 6 1                      | 0-0                 | 5-86               | 5                       | Μ     | loretr   |           |             | Ba       | <u>&amp;S</u> | Little Beaver 4" 9.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                              | 9.0                                                                            |  |  |  |
| CORI                    | ER                                     | ECC      | DVER                     | Y (F                | T./%               | CORE                    | BOXE  | SISAMPL  | ESEL. TO  | P CASI      | ING      | GR            | OUND EL. DEPTH/EL. GROUND WATER DEPTH,<br>41.5 ¥ 8.5/33.0 10-6-86                                                                                                                                                                                                                                                                                                                                                                                                                                                     | /EL. TOP                                                     | OF ROCK                                                                        |  |  |  |
| SAMI                    | PLE                                    | HA       |                          |                     |                    | /FALL                   | CAS   | ING LE   |           |             | A./I     | LEN           | GTH LOGGED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                              |                                                                                |  |  |  |
|                         | T                                      |          |                          | <u>N/A</u>          | <b>\</b>           |                         | JATER | <u> </u> | No        | ne          | 1        | TT            | D.McGrane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                              | <del></del>                                                                    |  |  |  |
| SAMP. TYPE<br>AND DIAM. | SAMP. ADV.                             | LEN CORE | SAMPLE REC.<br>CORE REC. | SAMPLE<br>BLOWS "N" | X CORE<br>RECOVERY | G. M. 4.0<br>NI<br>SSOJ | ESSU  | RE       | ELEV.     | DEPTH       | GRAPHICS | SAMPLE        | DESCRIPTION AND CLASSIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | WATER<br>CHARAC                                              | LEVELS,<br>RETURN,                                                             |  |  |  |
|                         |                                        |          |                          | -                   |                    |                         |       |          |           | -<br>-<br>5 |          |               | <ul> <li>0.0-9.0 ft. SILTY SAND (SM-SC). Color stratified; fine-to medium-grained; soft; poorly consolidated (loose); dry-saturated at 8.5 ft.</li> <li>0.0-0.5 ft. moderate brown (5YR3/4); numerous grass roots and organics; dry.</li> <li>0.5-3.0 ft., dark yellowish brown (10R3/4); few pieces of sandstone gravel.</li> <li>3.7-4.0 ft., pale green (5G7/2); clayey (SC); moist.</li> <li>4.0-9.0 ft., dark reddish brown; few rounded-angular pebbles of various lithologies (4.0-7.0 ft., fill?).</li> </ul> | solid-ster<br>Site chec<br>radioacti<br>contamin<br>hole gam | . using 4"<br>m augers.<br>ked for<br>ve<br>lation and<br>ma-logged<br>ne-TMA. |  |  |  |
|                         |                                        |          |                          |                     |                    |                         |       |          | 32.5<br>- |             |          |               | Bottom of borehole at 9.0 ft. Auger spoils<br>were immediately replaced in the hole,<br>10-6-86.                                                                                                                                                                                                                                                                                                                                                                                                                      | 8.5 ft. gr<br>observed                                       | ound water                                                                     |  |  |  |
|                         |                                        |          |                          |                     |                    |                         |       |          |           |             |          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                              |                                                                                |  |  |  |
|                         |                                        |          |                          |                     |                    |                         |       |          |           |             |          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Descripti<br>classificat<br>samples b<br>examinat            | ion of soil<br>y visual                                                        |  |  |  |
|                         |                                        |          |                          |                     |                    | = SHEL<br>TCHER;        |       |          |           | 1           | 1        | -             | ranca Court (LODI)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | HOLE NO.                                                     | IOR                                                                            |  |  |  |

|     |           |            |                  |                                                                    |         |           |                   | -        | PROJEC                                                         |          | IEET NO.           | ET NO. HOLE NO.                      |                              |                                      |               |                    |                                         |  |  |  |  |
|-----|-----------|------------|------------------|--------------------------------------------------------------------|---------|-----------|-------------------|----------|----------------------------------------------------------------|----------|--------------------|--------------------------------------|------------------------------|--------------------------------------|---------------|--------------------|-----------------------------------------|--|--|--|--|
|     |           | G          | EC               | DLOG                                                               | IC D    | RILI      | L LO              | G        |                                                                |          | FUSRAP 14501-138 1 |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     | SITE      |            |                  |                                                                    |         |           |                   | COORDINA | TES                                                            |          |                    | FROM HORIZ                           | BEARING                      |                                      |               |                    |                                         |  |  |  |  |
|     | BEGU      |            |                  | MPLETED                                                            |         |           |                   |          | N 2092; E 3563 Ver<br>DRILL MAKE AND MODEL SIZE OVERBURDEN ROO |          |                    |                                      |                              |                                      |               |                    | TOTAL DEPTH                             |  |  |  |  |
| 2.1 |           |            |                  | 0-6-86                                                             |         |           | RETR              | ENCH     | ľ                                                              |          |                    | little beaver                        | 4"                           | 8.0                                  |               | CK (FT.)           | 8.0                                     |  |  |  |  |
|     |           |            |                  | Y (FT./%                                                           |         |           |                   | ESEL. TO | P CASI                                                         |          |                    | UND EL. DEPTH/                       | EL. GRO                      | UND WATER                            |               | H/EL. TOP          |                                         |  |  |  |  |
|     |           |            | 1                |                                                                    |         |           |                   |          |                                                                |          |                    | 42.5                                 | 0/35.5 1                     | 0-6-86                               |               | /                  | ,<br>                                   |  |  |  |  |
|     | SAMP      | LE H       |                  | R WEIGHT                                                           | /FALL   | CAS       | ING LE            |          |                                                                | A./L     | ENG                | TH LOGGED BY:                        |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           | -          |                  | N/A                                                                |         | JATER     | <u> </u>          | NO       | NE                                                             | <u> </u> | <b>1</b>           |                                      |                              | D. MCC                               | JKANE         | ·<br>              |                                         |  |  |  |  |
|     | ЧРЕ<br>М. | 25         | ត្តី ប៉          | SAMPLE<br>BLOWS "N"<br>X CORE<br>RECOVERY                          | PR      | ESSU      | RE                |          | -                                                              | ဗ္ဂ      | ш                  |                                      |                              |                                      |               | NOTES              | 011                                     |  |  |  |  |
|     | DIAM.     | <b>₹</b> 0 | Ш<br>Ц<br>Ц<br>Ц | μ<br>μ<br>μ<br>μ<br>μ<br>μ<br>μ<br>μ<br>μ<br>μ<br>μ<br>μ<br>μ<br>μ |         |           |                   | ELEV.    | рертн                                                          | GRAPHICS | SAMPLE             | DESCRIPTION                          | AND C                        | LASSIFI                              | CATION        | WATER              | LEVELS,                                 |  |  |  |  |
|     | SAMP.     | μN         | ŤΨ               | S O S O                                                            | G. P. M | PRESS.    | ATN<br>MIN<br>NIN |          | 8                                                              | RAI      | 29                 |                                      |                              |                                      |               |                    | RETURN,<br>CTER OF                      |  |  |  |  |
|     | ₿ġ<br>B   | L N        | ŭ                | <u> </u>                                                           |         | <u>Ľ.</u> | - Σ               | 42.5     |                                                                | 0        |                    |                                      |                              |                                      |               |                    | ING, ETC.                               |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    | 0.0 - 8.0 FT. SILT<br>and natural ma | <u>ry sant</u><br>aterial; c | <u>), (</u> SM). Fi<br>olor stratifi | ll<br>ed;     | 8.0 ft. u          |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          | _                                                              |          |                    | fine to medium<br>consolidated (le   | oose); mo                    | ; soft; poor<br>oist to satur        | ly<br>ated at | solid-st           | em augers.                              |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          | -                                                              |          |                    | 7.0 ft.<br>0.0-0.5 ft., mod          | derate br                    | own (5 YR                            | 3/4),         |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          | .                                                              |          |                    | numerous grass<br>0.5-3.0 ft., darl  | k reddish                    | brown (10                            | R 3/4):       |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          | 5_                                                             |          |                    | few rounded pe<br>piece of plastic   | (3.0 ft.):                   | fill?                                |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    | 3.0-4.0 ft., mod<br>grayish black (  | N2).                         |                                      | ottled        | radioact           |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   | Ī        | <u>z</u> .                                                     |          |                    | 4.0-8.0 ft., dar                     | k reddish                    | brown.                               |               |                    | ination and<br>nma-logged<br>·line-TMA, |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   | 34.5_    |                                                                |          |                    |                                      |                              |                                      |               | Corp.              |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    | Bottom of boring                     | at 8.0 ft.                   |                                      |               | ft. Cob            | efusal at 8.0<br>ble?                   |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    | Borehole backfille                   | d with sp                    | olls, 10-6-8                         | 56.           |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               | Ground<br>observe  | water<br>d, 10-6-86.                    |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
| -   |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
| 1   |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  | 1                                                                  |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         | l         |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  | 1                                                                  | 1       |           |                   |          |                                                                | 1 .      |                    |                                      |                              |                                      |               | 1                  |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          | 1                                                              | 1        |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            | l                |                                                                    |         |           |                   |          |                                                                |          | ·                  |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    | 1       |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                | 1        |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          | ł                                                              |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   | 1        |                                                                |          |                    |                                      |                              |                                      |               | classific          | tion and<br>ation of soil               |  |  |  |  |
|     |           |            |                  |                                                                    | 1       | ļ         |                   |          |                                                                |          |                    |                                      |                              |                                      |               | samples<br>examina | s by visual<br>ation.                   |  |  |  |  |
|     |           |            |                  |                                                                    | 1       |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           |                   |          |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  |                                                                    |         |           | I                 | I        |                                                                |          |                    |                                      |                              |                                      |               |                    |                                         |  |  |  |  |
|     |           |            |                  | POON; \$1                                                          |         |           |                   | ITE      |                                                                | 44       |                    |                                      |                              |                                      |               | HOLE NO            |                                         |  |  |  |  |
|     | D =       | DENN       | ISON             | ; P = PI                                                           | TCHER;  | 0 = 0     | DTHER             |          |                                                                | 1]       |                    | Branca Ct.                           | (LUL                         | <u>4)</u>                            | ١             |                    | 511R                                    |  |  |  |  |