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DOE/OR/20722-251

M-015

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

RADIOLOGICAL CHARACTERIZATION REPORT FOR THE COMMERCIAL PROPERTY AT 160 AND 174 ESSEX STREET (NATIONAL COMMUNITY BANK)

Lodi, New Jersey

September 1989

Bechtel National, Inc.

063982

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SEP 29 1989

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Attention: Robert G. Atkin
Technical Services Division

Subject: Bechtel Job No. 14501, FUSRAP Project
DOE Contract No. DE-AC05-81OR20722
Publication of Radiological Characterization Report for seventeen residential properties, four municipal properties, and seven commercial properties in Lodi and Maywood, New Jersey
Code: 7315/WBS: 138

Dear Mr. Atkin:

Enclosed is one copy each of the 28 subject published reports for the properties listed in Attachment 1. These reports incorporate all comments received in this review cycle (CCNs 063165, 063327, 062285, and 061568) and are being published with approval of Steve Oldham, as reported in CCN 063868.

Also enclosed (as Attachment 2) is a proposed distribution list for these reports. Please send us any changes to the proposed distribution list at your earliest convenience so we may distribute the reports.

BNI would like to express our thanks to Mr. Oldham for his cooperation and efforts to review these drafts in an accelerated manner. His efforts have allowed us to publish these reports on schedule. If you have any questions about these documents, please call me at 576-4718.

Very truly yours,

R. C. Robertson
Project Manager - FUSRAP

RCR:wfs:1756x
Enclosure: As stated

cc: J. D. Berger, ORAU (w/e)
N. J. Beskid, ANL (w/e)

CONCURRENCE

DOE				

DOE/OR/20722-232

RADIOLOGICAL CHARACTERIZATION REPORT FOR THE COMMERCIAL PROPERTY AT 160 AND 174 ESSEX STREET LODI, NEW JERSEY

SEPTEMBER 1989

Prepared for

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

By

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Bechtel Job No. 14501

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ABBREVIATIONS

cm	centimeter
cm^2	square centimeter
cpm	counts per minute
dpm	disintegrations per minute
ft	foot
h	hour
in.	inch
km^2	square kilometer
L	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
yd	yard
yd^3	cubic yard

1.0 INTRODUCTION AND SUMMARY

This section provides a brief description of the history and background of the Maywood site and its vicinity properties. Data obtained from the radiological characterization of this vicinity property are also presented.

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 under the Formerly Utilized Sites Remedial Action Program (FUSRAP) under the direction of the DOE Division of Facility and Site Decommissioning Projects. Several residential, commercial, and municipal 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 U.S. Government initiated FUSRAP in 1974 to identify, clean up, or otherwise control sites where low-activity radioactive contamination (exceeding current guidelines) remains from the early years of the nation's atomic energy program or from commercial operations that resulted in conditions Congress has mandated that DOE 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.

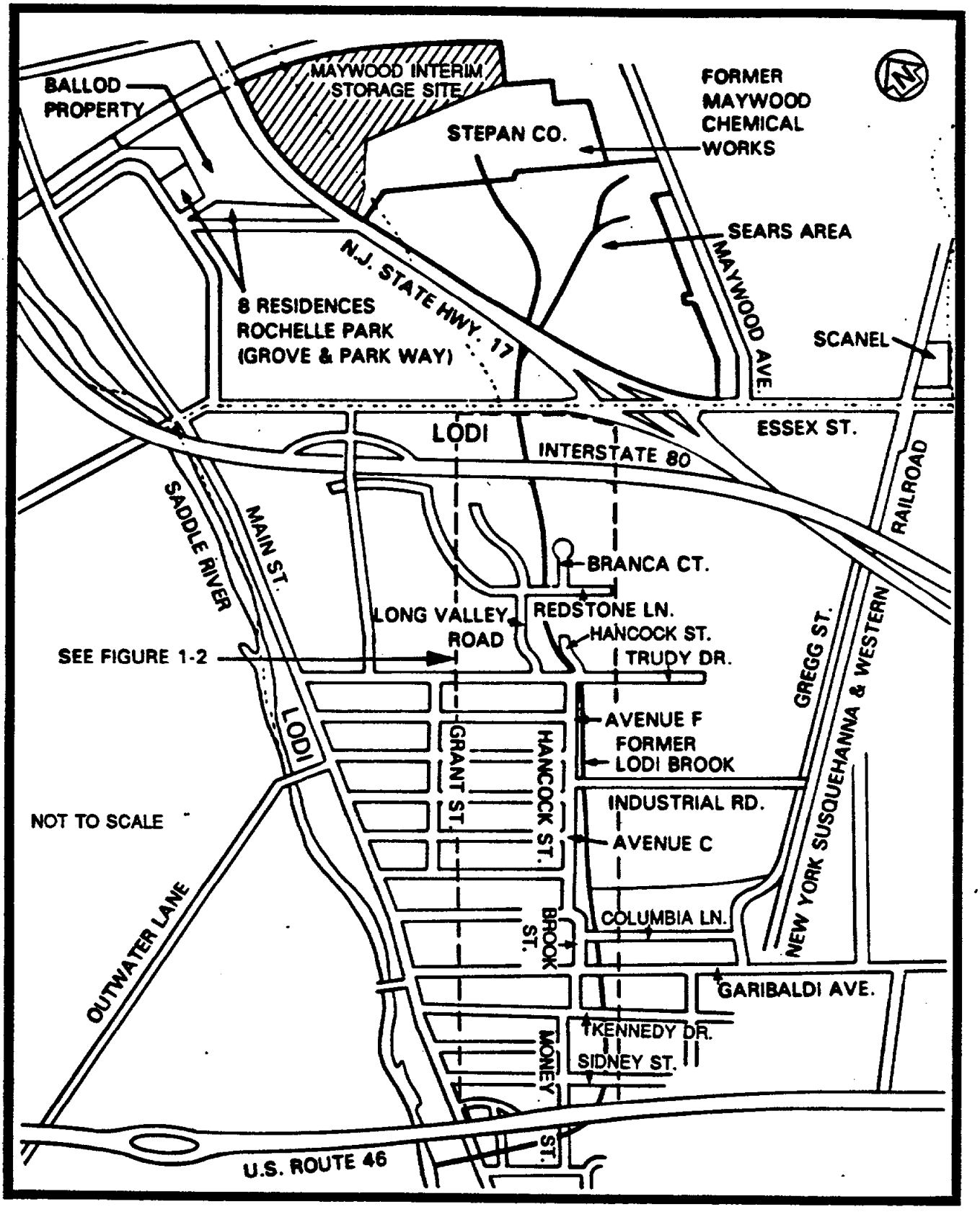

FIGURE 1-1 LOCATION OF LODI VICINITY PROPERTIES

1.2 PURPOSE

The purpose of the 1987 survey performed by BNI was to locate the horizontal and vertical boundaries of radionuclide concentrations exceeding remedial action guidelines.

1.3 SUMMARY

This report details the procedures and results of the radiological characterization of the property at 160 and 174 Essex Street (Figure 1-2) in Lodi, New Jersey, which was conducted in November 1987. Additional data was obtained in October 1988.

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

The commercial properties at 160 and 174 Essex Street consist of a gravel surfaced vacant lot used as a parking lot (160 Essex Street), and a one story stucco building surrounded by an asphalt paved area (174 Essex Street) occupied by the National Community Bank. The properties are situated in a heavily commercialized area along a major thoroughfare (Essex Street) that forms the boundary between the Boroughs of Lodi and Maywood. The properties lie on the Lodi side of Essex Street and are bordered by commercial properties to the north and northwest, an interstate highway to the south, and a military reserve facility to the east. Entrance to the properties is from Essex Street. Access to the properties to conduct radiological characterization was extremely restricted. All work activities were performed during non-business hours on weekdays or on weekends. Access to the interior of the bank building was prohibited, therefore interior measurements could not be made.

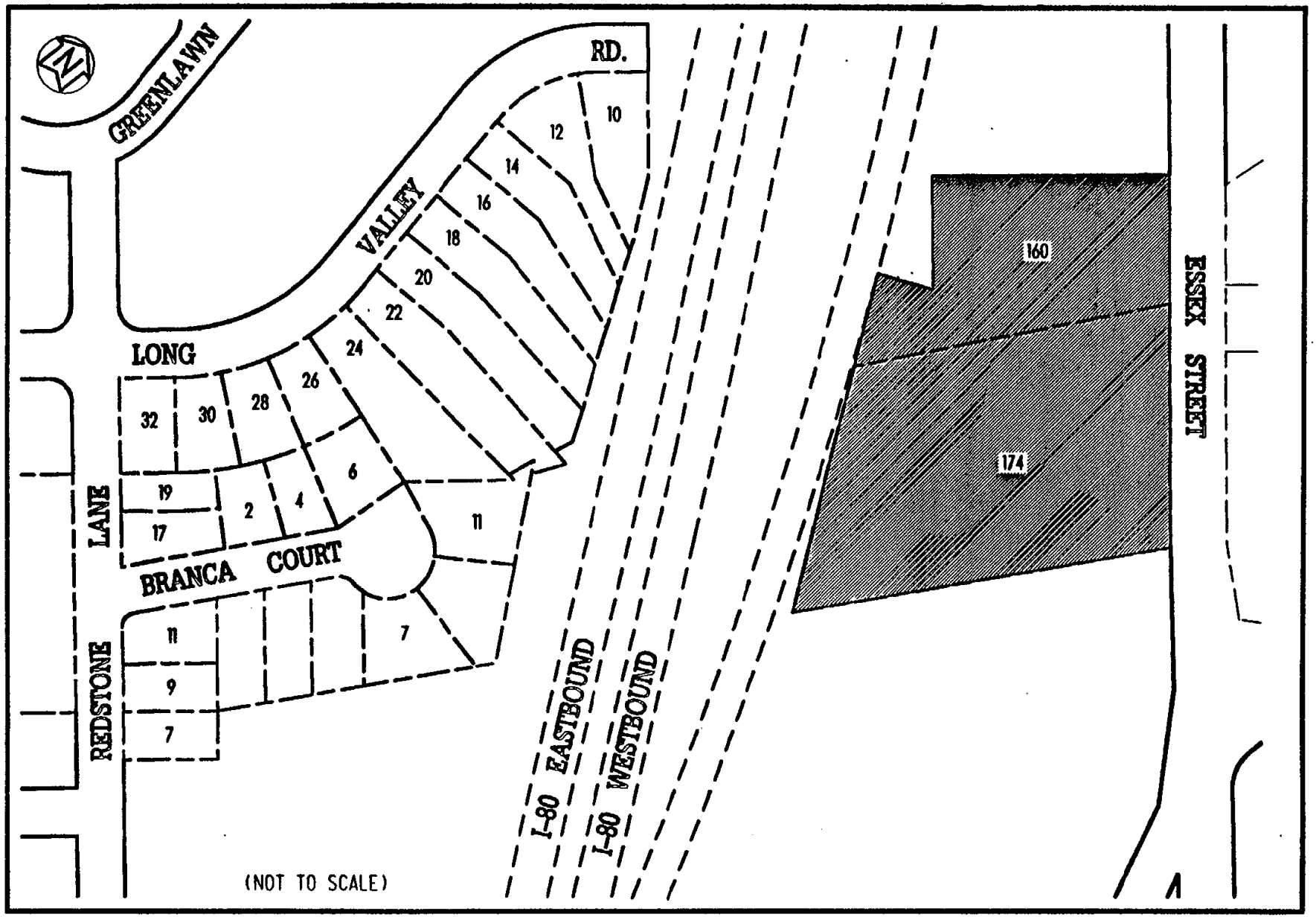

FIGURE 1-2 LOCATION OF 160 AND 174 ESSEX STREET

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This characterization confirmed that thorium-232 is the primary radioactive contaminant at this property. Results of surface soil samples for 160 and 174 Essex Street showed maximum concentrations of thorium-232 and radium-226 to be less than 3.0 and 1.2 pCi/g, respectively. The maximum concentration of uranium-238 in surface soil samples was less than 10.1 pCi/g.

Subsurface soil sample concentrations ranged from 0.7 to 4.6 pCi/g for thorium-232 and from 0.5 to 1.1 pCi/g for radium-226. The average background level in this area for both radium-226 and thorium-232 is 1.0 pCi/g. The concentrations of uranium-238 in subsurface soil samples ranged from less than 4.5 to less than 7.2 pCi/g. 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 conservative 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, the vicinity properties will be decontaminated in a manner so as to reduce future doses to levels that are as low as reasonably achievable (ALARA) (Ref. 2).

Soil analysis data for this property did not indicate surface contamination. Subsurface investigation by gamma logging indicated contamination to a depth of 1.83 m (6.0 ft).

Exterior gamma radiation exposure rates ranged from 5 to 8 μR/h, including background. No indoor measurements could be obtained because of restricted access to the building.

All data tables for this property appear at the end of this report.

1.4 CONCLUSIONS

Evaluation of data collected, analyses performed, and historical documentation reviewed indicates the presence of radiological contamination on the properties located at 160 and 174 Essex Street. This contamination is primarily subsurface contamination ranging from a depth of 15.2 cm (0.5 in.) to 1.83 m (6.0 ft). In addition, the contamination appears to be located mainly on the 160 Essex Street property (area used for parking) and there is a high probability that the contamination extends beneath the street in front of that property. There is a smaller area of contamination in the southeast corner of the 174 Essex Street property. The total affected area is estimated to be approximately 15 percent of the properties. These conclusions are supported by documentation that establishes the presence of the former channel of Lodi Brook in this area. This channel is the suspected transport mechanism for the radiological contamination.

It is known from review of aerial photographs prior to the construction of the bank building that the original channel of Lodi Brook flowed through these properties. The former channel was realigned prior to and during commercial development of the area. A portion of the present day realigned channel can be seen above ground in an open culvert at the rear of the 160 Essex Street property near the interstate. The channel is contained, to this point, in buried conduit from a point above ground along New Jersey Route 17 in the Borough of Maywood, passing beneath commercial property in Maywood, Essex Street and the parking area at 160 Essex Street where it surfaces in the open culvert. It then flows into buried conduit and passes beneath the interstate.

2.0 SITE HISTORY

The Maywood Chemical Works was founded in 1895. The company began processing thorium from monazite sand in 1916 (during World War I) for use in manufacturing gas mantles for various lighting devices. Process wastes from manufacturing operations were pumped to two areas surrounded by earthen dikes 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 coca leaves mixed with other material resulting from operations at the plant. Some fill material apparently contained thorium process wastes (Ref. 3).

Uncertainty exists as to 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. First, 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 developed. Second, samples taken from Lodi properties indicate elevated concentrations of a series of elements known as rare earths. Rare earth elements are typically found in monazite sands, which also contain 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 on 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 recalled chemical odors in and around the brook in Lodi and steam rising off the water. These observations suggest that discharges of contaminants occurred 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

Numerous surveys of the Maywood site and its vicinity properties have been conducted. Among the past surveys, three that are pertinent to this vicinity property are detailed in this section.

January 1981--The Nuclear Regulatory Commission directed that a survey be conducted of the Stepan Company property and its vicinity properties in January 1981. Using the Stepan Company plant as the center, a 10.3-km^2 (4-$mi^{2)}$ aerial survey was conducted by the EG&G Energy Measurements Group, which identified anomalous concentrations of thorium-232 to the north and south of the Stepan Company property. The Lodi vicinity properties were included in this survey (Ref. 6).

June 1984--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).

September 1986--At the request of DOE, ORNL conducted radiological surveys of the vicinity properties in Lodi in September 1986 to determine which properties contained radioactive contamination in excess of DOE guidelines and would, therefore, require remedial action (Ref. 8 and 9).

2.2 REMEDIAL ACTION GUIDELINES

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 U.S. Environmental Protection Agency (EPA) for the Uranium Mill Tailings Remedial Action Program.

TABLE 2-1
SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES

BASIC DOSE LIMITS

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

SOIL GUIDELINES

Radionuclide	Soil Concentration (pCi/g) Above Background[a,b,c]
Radium-226 Radium-228 Thorium-230 Thorium-232	5 pCi/g when averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over any 15-cm-thick soil layer below the surface layer.
Other Radionuclides	Soil guidelines will be calculated on a site-specific basis using the DOE manual developed for this use.

STRUCTURE GUIDELINES

Airborne Radon Decay Products

Generic guidelines for concentrations of airborne radon decay products shall apply to existing occupied or habitable structures on private property that has no radiological restrictions on its use; structures that will be demolished or buried are excluded. The applicable generic guideline (40 CFR 192) is: In any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL[d]. In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL. Remedial actions are not required in order to comply with this guideline when there is reasonable assurance that residual radioactive materials are not the cause.

External Gamma Radiation

The average level of gamma radiation inside a building or habitable structure on a site that has no radiological restrictions on its use shall not exceed the background level by more than 20 μR/h.

Indoor/Outdoor Structure Surface Contamination

Radionuclide[f]	Allowable Surface Residual Contamination[e] (dpm/100 cm²) Average[g,h]	Maximum[h,j]	Removable[h,j]
Transuranics, Ra-226, Ra-228, Th-230, Th-228 Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224 U-232, I-126, I-131, I-133	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay products	5,000 α	15,000 α	1,000 α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 β - γ	15,000 β - γ	1,000 β - γ

TABLE 2-1
(CONTINUED)

[a]These guidelines take into account ingrowth of radium-226 from thorium-230 and of radium-228 from thorium-232, and assume secular equilibrium. If either thorium-230 and radium-226 or thorium-232 and radium-228 are both present, not in secular equilibrium, the guidelines apply to the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that 1) the dose for the mixtures will not exceed the basic dose limit, or 2) the sum of ratios of the soil concentration of each radionuclide to the allowable limit for that radionuclide will not exceed 1 ("unity").

[b]These guidelines represent allowable residual concentrations above background averaged across any 15-cm-thick layer to any depth and over any contiguous 100-m^2 surface area.

[c]Localized concentrations in excess of these limits are allowable, provided that the average concentration over a 100-m^2 area does not exceed these limits. In addition, every reasonable effort shall be made to remove any source of radionuclide that exceeds 30 times the appropriate soil limit, regardless of the average concentration in the soil.

[d]A working level (WL) is any combination of short-lived radon decay products in 1 liter of air that will result in the ultimate emission of 1.3 x 105 MeV of potential alpha energy.

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

[f]Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

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

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

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

[j]The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. The numbers in this column are maximum amounts.

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 were required to comply with the provisions of BNI health and safety requirements and as directed by the on-site BNI Health and Safety Officer.

3.1 SUBCONTRACTOR TRAINING

Before the start of work, all subcontractor personnel attended an orientation session presented by the BNI Health and Safety Officer to explain the nature of the material to be encountered in the work and the personnel monitoring and safety measures that are required.

3.2 SAFETY REQUIREMENTS

Subcontractor personnel complied with the following BNI requirements:

- Bioassay--Subcontractor personnel submitted bioassay samples before or at the beginning of on-site activity, upon completion of the activity, and periodically during site activities as requested by BNI.
- Protective Clothing/Equipment--Subcontractor personnel were required to wear the protective clothing/equipment specified in the subcontract or as directed by the BNI Health and Safety Officer.
- Dosimetry--Subcontractor personnel were required to wear and return daily the dosimeters and monitors issued by BNI.
- Controlled Area Access/Egress--Subcontractor personnel and equipment entering areas where access and egress were controlled for radiation and/or chemical safety purposes were surveyed by the BNI Health and Safety Officer (or personnel representing BNI) for contamination before leaving those areas.

- Medical Surveillance--Upon written direction from BNI, subcontractor personnel who work in areas where hazardous chemicals might exist were 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 was under the direct supervision of personnel representing BNI.

Health and safety-related requirements for all activities involving exposure to radiation, radioactive material, chemicals, and/or chemically contaminated materials and other associated industrial safety hazards are generated in compliance with applicable regulatory requirements and industry-wide standards. Copies of these requirements are located at the BNI project office for use by project 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 was adjusted to characterize each property adequately. 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 with the east and north coordinates is shown on all figures included in Sections 4.0 and 5.0 of this report.

4.1 FIELD RADIOLOGICAL CHARACTERIZATION

This section provides a description of the instrumentation and methodologies used to obtain exterior surface and subsurface measurements during radiological characterization of this property.

4.1.1 Measurements Taken and Methods Used

An initial walkover survey was performed using an unshielded gamma scintillation detector [5.0- by 5.0-cm (2- by 2-in.) thallium-activated sodium iodide probe] to identify areas of elevated radionuclide activity. Near-surface gamma measurements taken using a cone-shielded gamma scintillation detector were also used to determine areas of surface contamination. 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 30.4 cm (12 in.) above the ground at the intersections of

3.0-m (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 approximately 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. 10).

A subsurface investigation was conducted to determine the depth to which the previously identified surface contamination extended and to locate subsurface contamination where there was no surface manifestation. The subsurface characterization consisted of drilling 28 boreholes (Figure 4-1), using either a 7.6-cm- (3-in.-) or 15.2-cm- (6-in.-) diameter auger bit, and gamma logging them. The boreholes 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 accomplished in less time than collecting soil samples, and the need for analyzing these samples in a laboratory is eliminated. A 5.0- by 5.0-cm (2- 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. This relationship has also been corroborated by results from previous characterizations where thorium-232 was found (Ref. 10).

Gamma radiation measurements were taken at 15.2-cm (6-in.) vertical intervals to determine the depth and concentration

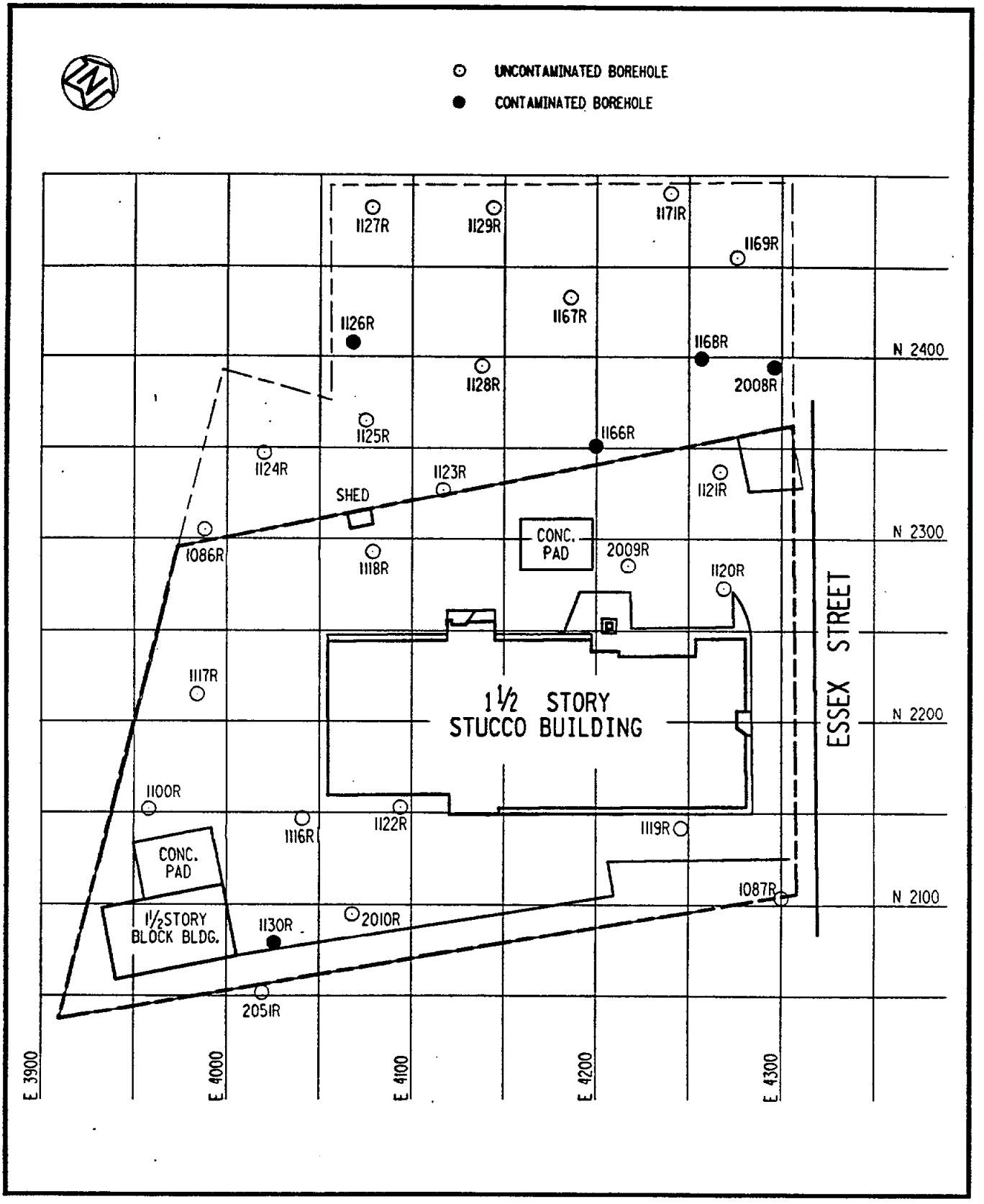

FIGURE 4-1 BOREHOLE LOCATIONS AT 160 AND 174 ESSEX STREET

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of the contamination. The gamma-logging data were reviewed to identify trends, whether or not 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, 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, 8, and 9), the locations of biased surface soil samples were selected to better define the limits of contamination. Surface soil samples were taken at ten locations (Figure 4-2) and analyzed for thorium-232, uranium-238, 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 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 twenty-six locations (Figure 4-2) using a 7.6-cm (3.0-in.) outside diameter (O.D.) split-spoon sampler mounted on a tripod or attached to a truck-mounted auger stem. The subsurface soil samples were analyzed for radium-226, uranium-238, and thorium-232 in the same manner as the surface soil samples.

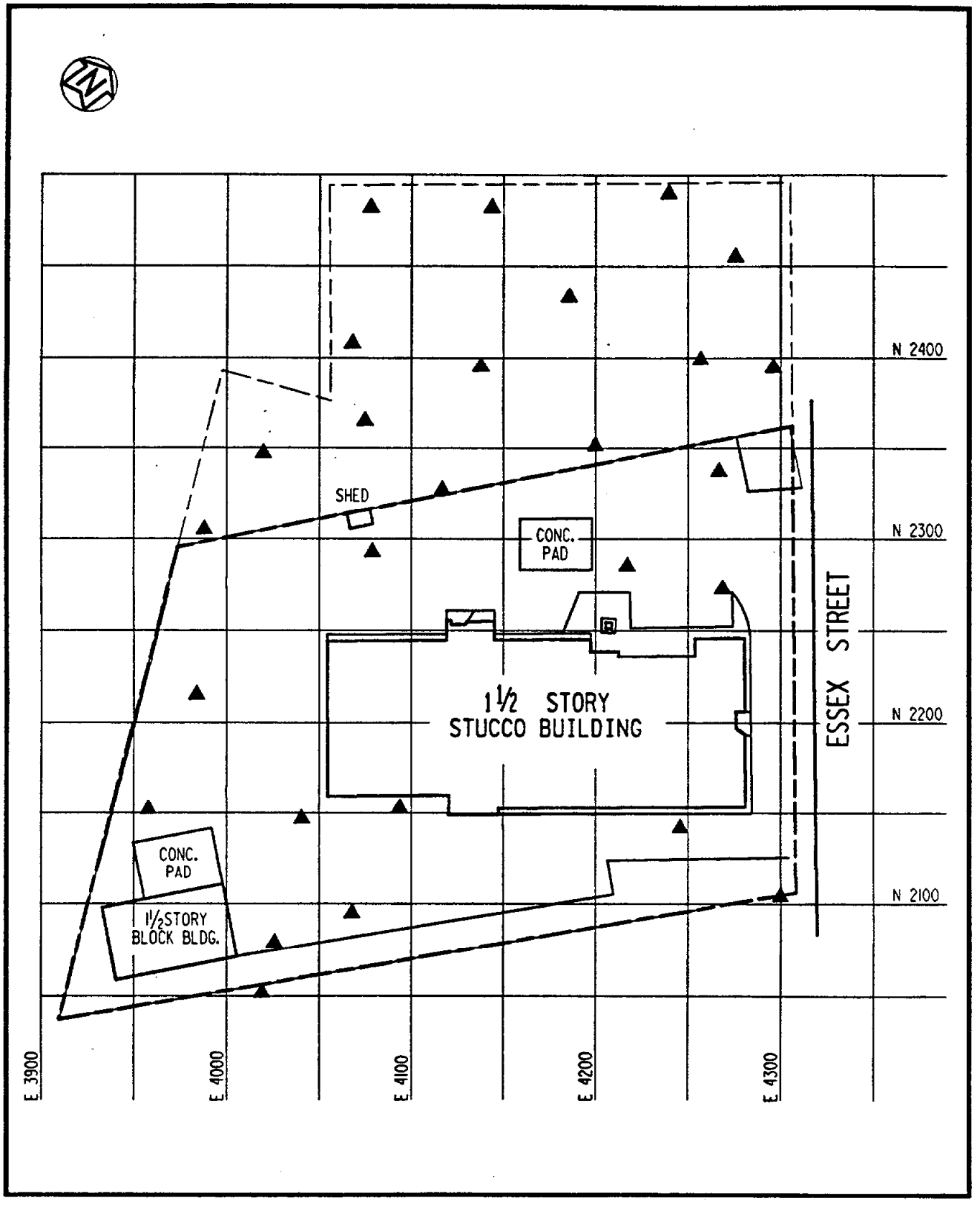

FIGURE 4-2 SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS AT 160 AND 174 ESSEX STREET

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4.2 BUILDING RADIOLOGICAL CHARACTERIZATION

Access to the properties at 160 and 174 Essex Street was extremely limited because of heavy traffic during business hours. Because access was prohibited to the building, this element of the characterization activities was not performed.

Exterior gamma exposure rate measurements were made at eight locations throughout the property grid system. To obtain these measurements, either a 5.0- by 5.0-cm (2- by 2-in.) thallium-activated sodium iodide gamma scintillation detector designed to detect gamma radiation only or a pressurized ionization chamber (PIC) was used. Measurement locations are shown in Figure 4-3. The PIC instrument has a response to gamma radiation that is proportional to exposure in roentgens. A conversion factor for gamma scintillation to the PIC was established through a correlation of these two measurements at four locations in the vicinity of the property. The unshielded gamma scintillation detector readings were then used to estimate gamma exposure rates for each location. These measurements were taken 1 m (3 ft) above the ground. The locations were determined to be representative of the entire property.

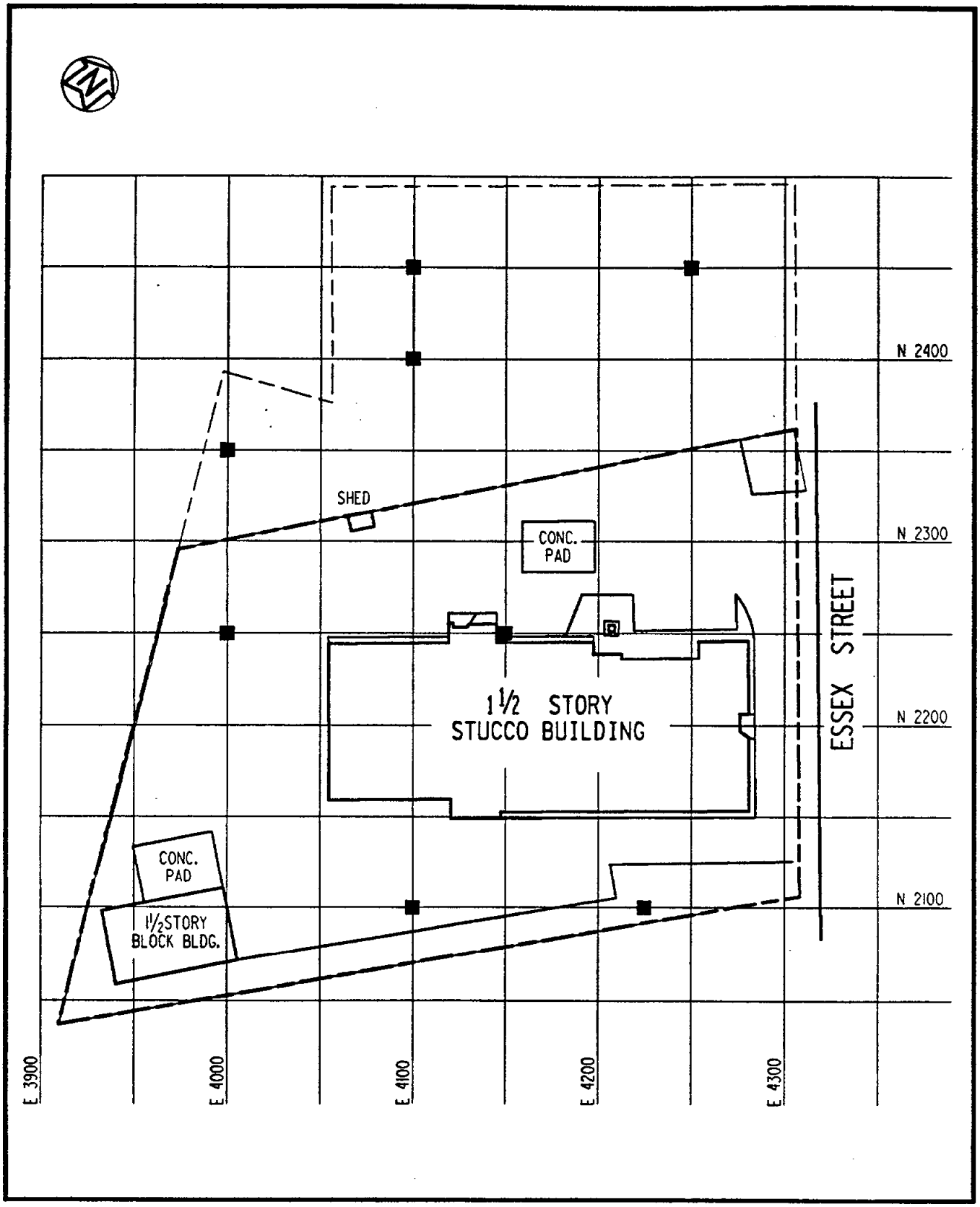

FIGURE 4-3 GAMMA EXPOSURE RATE MEASUREMENT LOCATIONS AT 160 AND 174 ESSEX STREET

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5.0 CHARACTERIZATION RESULTS

Radiological characterization results are presented in this section. The data included represent exterior surface and subsurface radiation measurements and interior radiation measurements.

5.1 FIELD RADIOLOGICAL CHARACTERIZATION

Near-surface gamma radiation measurements on the property ranged from 5,000 cpm to approximately 9,000 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 and the basis for selecting the locations of soil samples. No areas of surface contamination were indicated by near-surface gamma measurements.

Surface soil samples [depths from 0.0 to 15.2 cm (0.5 in.)] were taken at ten locations on the properties (Figure 4-2). These samples were analyzed for thorium-232, uranium-238, and radium-226. The concentrations in these samples ranged from 3.5 to less than 8.7 pCi/g for uranium-238, from less than 0.7 to less than 2.1 pCi/g for thorium-232, and from less than 0.5 to less than 1.4 pCi/g for radium-226. Analytical results for surface soils are provided in Table 5-1; these data showed that concentrations of thorium-232 do not exceed DOE guidelines (5 pCi/g plus background of 1 pCi/g for surface soils) with a maximum concentration of less than 2.1 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. The "less than" value 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.

Thorium-232, the primary contaminant at the site, is the radionuclide most likely to exceed a specific DOE guideline in soil. Parameters for soil sample analysis were selected to ensure that the thorium-232 would be detected and measured at concentrations well below the lower guideline value of 5 pCi/g in excess of background level. Radionuclides of the uranium series, specifically uranium-238 and radium-226, are also potential contaminants but at lower concentrations than thorium-232. Therefore, these radionuclides (considered secondary contaminants) would not be present in concentrations in excess of guidelines unless thorium-232 was also present in concentrations in excess of its guideline level. Parameters selected for the thorium-232 analyses also provide detection sensitivities for uranium-238 and radium-226 that demonstrate that concentrations of these radionuclides are below guidelines. However, because of the relatively low gamma photon abundance of uranium-238, many of

the uranium-238 concentrations were below the detection sensitivity of the analytical procedure; these concentrations are reported in the data tables as "less than" values. To obtain more sensitive readings for the uranium-238 radionuclide with these analytical methods, much longer instrument counting times would be required than were necessary for analysis of thorium-232, the primary contaminant.

Analytical results for subsurface soil samples are given in Table 5-1, and gamma logging data are given in Table 5-2. The results in Table 5-2 showed a range from 4,000 cpm to 50,000 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 [taken at depths from 15.2 to 30.4 cm (0.5 to 1.0 ft)] indicated uranium-238 concentrations ranging from less than 1.0 to 7.2 pCi/g, thorium-232 concentrations ranging from 0.5 to 11.9 pCi/g, and radium-226 concentrations ranging from 0.4 to 3.2 pCi/g.

On the basis of near-surface gamma radiation measurements, surface and subsurface soil sample analyses, and downhole gamma logging, contamination on this property is believed to consist primarily of subsurface contamination at depths ranging from 15.2 cm (0.5 in.) to 1.83 m (6.0 ft). The areas of subsurface contamination are shown in Figure 5-1. The subsurface contamination appears to be primarily on the 160 Essex Street property and there is a high probability that it extends beneath the street in front of that property. There is a smaller area of subsurface contamination in the southeast corner of the 174 Essex Street property that may extend beneath a small, concrete utilities building.

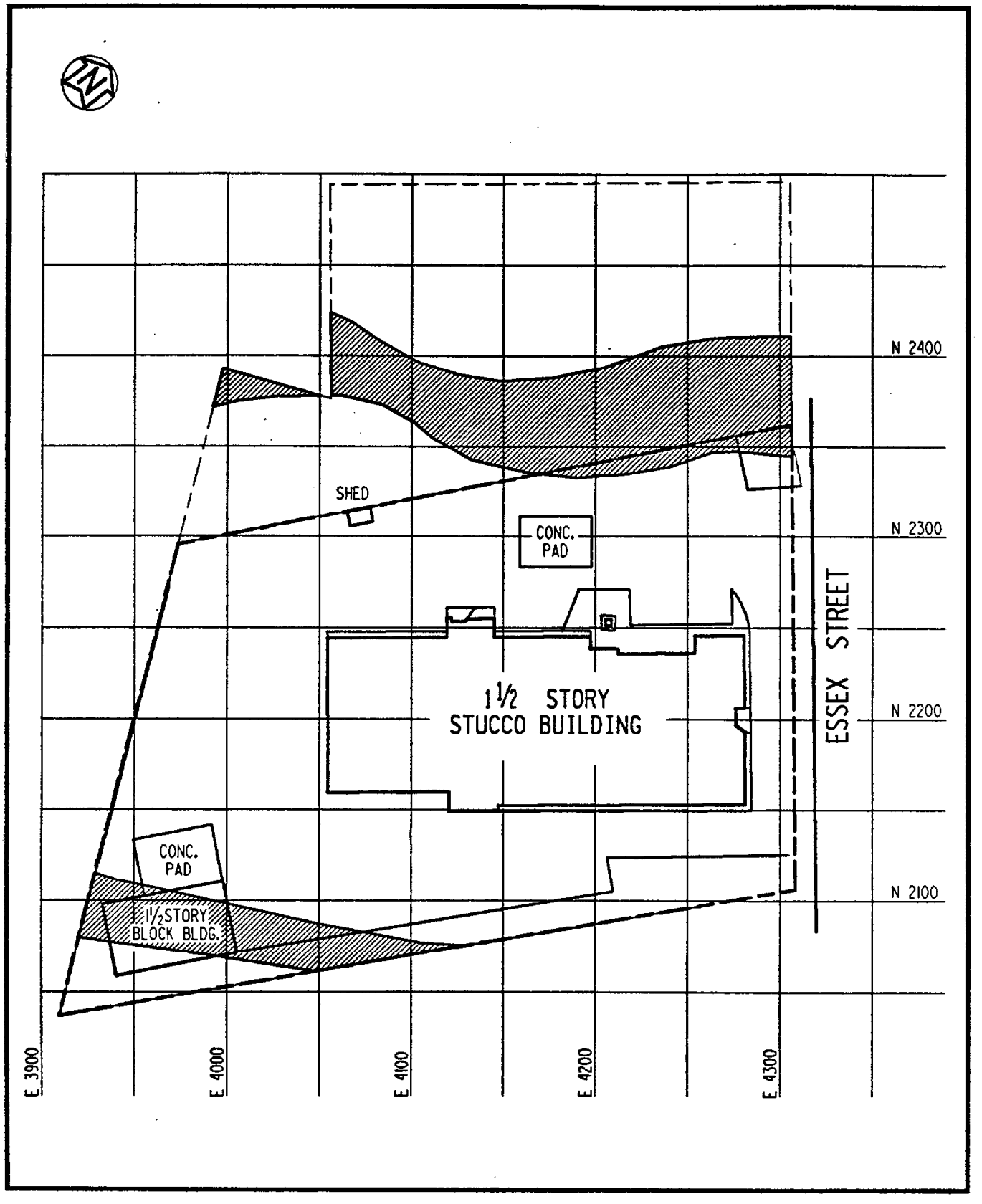

FIGURE 5-1 AREAS OF SUBSURFACE CONTAMINATION AT 160 AND 174 ESSEX STREET

M38W9855.DGN

It is apparent from review of historical documentation (e.g., aerial photographs of the area, interviews with local residents, and previous radiological surveys) that the subsurface contamination on this property lies along the former channel of Lodi Brook and its associated floodplain. The contamination on this property is similar to contamination found on residential and commercial properties in close proximity to this property. It has been established that the Lodi Brook channel through these neighboring properties once occupied locations connecting to those where stream sediments were found at 160 and 174 Essex Street. Thus, the elevated gamma readings shown on gamma logs from boreholes drilled on this property serve as further indication of the suspected mechanism of transport for radiological contamination (i.e., stream deposition from Lodi Brook).

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

No indoor measurements were obtained because of restricted access to the building.

Exterior gamma radiation exposure rate measurements ranged from 5 to 8 μR/h, including background. These results can be found in Table 5-3. The average exposure rate for these properties is 6 μR/h, which is less than the average background exposure rate of 9 μR/h (Ref. 11). Therefore, the occupants of the bank receive no dose in excess of average background as a result of contamination on these properties.

Based on the above information, the exposure rates at this property are within DOE guidelines. Further, it should be emphasized that natural background exposure rates vary widely across the Unites States and are often significantly higher than average background for this area.

TABLE 5-1

SURFACE AND SUBSURFACE RADIONUCLIDE CONCENTRATIONS IN SOIL

FOR 160 AND 174 ESSEX STREET

Coordinates[a]		Depth	Concentration (pCi/g ± 2 sigma)		
East	North	(ft)	Uranium-238	Radium-226	Thorium-232
3984	2215	0.0 - 1.0	< 4.9	< 1.3	< 1.9
3984	2215	4.0 - 5.0	< 6.0	< 1.5	< 1.8
3984	2215	8.0 - 9.0	< 3.8	< 1.1	< 1.7
3984	2215	9.0 - 10.0	< 4.3	< 1.1	< 1.7
3988	2305	0.0 - 1.0	< 4.3	< 1.0	< 1.5
3988	2305	1.0 - 2.2	< 3.6	< 0.9	< 1.6
3988	2305	2.2 - 2.5	< 4.6	< 1.3	< 1.9
3988	2305	2.5 - 2.6	< 4.5	< 1.2	< 1.2
3988	2305	2.6 - 3.3	< 4.0	< 1.1	< 1.1
3988	2305	3.3 - 4.5	< 4.2	< 1.1	< 1.5
3988	2305	4.5 - 5.5	< 4.1	< 1.2	< 1.3
3988	2305	5.1 - 6.4	< 3.8	< 1.0	< 1.3
3988	2305	6.4 - 6.9	< 3.1	< 0.8	< 1.6
3988	2305	6.9 - 7.9	< 3.0	< 0.7	< 1.1
3988	2305	7.9 - 8.5	< 4.6	< 1.2	< 1.7
3988	2305	8.5 - 9.5	< 2.9	< 0.8	< 1.3
3988	2305	9.5 - 10.5	< 2.6	< 0.7	< 1.3
3988	2305	10.5 - 11.5	< 2.4	< 0.7	< 1.0
3988	2305	11.5 - 12.5	< 2.9	< 0.8	< 1.1
3988	2305	12.5 - 13.3	< 3.0	< 0.6	< 1.1
3988	2305	13.3 - 14.5	< 3.6	< 0.8	< 1.3
3988	2305	14.3 - 15.1	< 2.9	< 0.8	< 1.0
4019	2051	0.0 - 0.5	< 2.0	0.7 ± 0.2	1.2 ± 0.5
4019	2051	0.5 - 1.0	< 2.0	< 1.0	< 1.0

TABLE 5-1

(continued)

Coordinates[a] East	Coordinates[a] North	Depth (ft)	Concentration (pCi/g ± 2 sigma) Uranium-238	Radium-226	Thorium-232
4019	2051	1.0 - 1.5	< 2.0	< 1.0	< 1.0
4019	2051	1.5 - 2.0	< 1.0	0.8 ± 0.3	1.1 ± 0.3
4019	2051	2.0 - 2.5	< 2.0	0.6 ± 0.1	0.8 ± 0.2
4019	2051	2.5 - 3.0	< 2.0	< 1.0	< 1.0
4019	2051	3.0 - 3.5	< 3.0	< 1.0	< 1.0
4019	2051	3.5 - 4.0	< 2.0	< 1.0	1.3 ± 0.5
4019	2051	4.0 - 4.5	< 3.0	< 1.0	1.1 ± 0.8
4019	2051	4.5 - 5.0	< 2.0	0.5 ± 0.3	1.0 ± 0.4
4019	2051	5.0 - 5.5	< 2.0	0.9 ± 0.6	1.2 ± 0.6
4019	2051	5.5 - 6.0	< 2.0	0.8 ± 0.3	1.0 ± 0.3
4019	2051	6.0 - 6.5	2.0 ± 1.7	0.8 ± 0.3	1.1 ± 0.3
4019	2051	6.5 - 7.0	< 2.0	1.2 ± 0.3	1.5 ± 0.3
4020	2347	0.0 - 0.5	< 2.0	< 0.5	< 0.8
4020	2347	0.0 - 2.0	< 4.8	< 0.9	< 1.9
4020	2347	4.0 - 6.0	< 2.2	< 0.6	< 0.8
4020	2347	6.0 - 7.0	< 3.4	< 1.0	< 1.3
4020	2347	7.0 - 8.0	< 3.1	< 0.9	< 1.4
4026	2079	0.0 - 0.5	< 4.5	< 1.3	< 1.7
4026	2079	0.0 - 1.0	< 3.2	< 0.9	< 1.4
4026	2079	1.0 - 2.0	< 3.9	< 1.1	< 1.5
4026	2079	2.0 - 4.0	< 3.1	< 0.8	< 1.3
4026	2079	4.0 - 4.7	< 7.0	< 1.8	< 2.7
4041	2147	0.0 - 2.0	< 4.3	< 1.2	< 1.5
4041	2147	3.0 - 4.0	< 4.3	< 1.2	< 1.6
4041	2147	4.0 - 6.0	< 3.8	< 0.9	< 1.1

TABLE 5-1

(continued)

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Coordinates[a] East	Coordinates[a] North	Depth (ft)	Concentration (pCi/g ± 2 sigma) Uranium-238	Radium-226	Thorium-232
4041	2147	6.0 - 8.0	< 3.1	< 0.8	< 1.4
4041	2147	8.0 - 9.0	< 4.9	< 1.3	< 1.7
4041	2147	9.0 - 10.0	< 5.6	3.2 ± 0.3	4.1 ± 0.6
4068	2095	1.0 - 1.5	1.5 ± 0.6	0.6 ± 0.1	0.7 ± 0.1
4068	2095	1.5 - 2.0	2.7 ± 2.6	0.8 ± 0.2	1.6 ± 0.8
4068	2095	2.0 - 2.5	< 2.0	0.8 ± 0.2	1.2 ± 0.4
4068	2095	2.5 - 3.0	< 3.0	1.1 ± 0.2	1.1 ± 0.7
4068	2095	3.0 - 3.5	< 2.0	0.7 ± 0.3	1.2 ± 0.2
4068	2095	3.5 - 4.0	< 2.0	0.7 ± 0.5	1.3 ± 0.6
4068	2095	4.0 - 4.5	< 2.0	< 1.0	< 1.0
4068	2095	4.5 - 5.0	< 2.0	0.7 ± 0.2	1.0 ± 0.3
4068	2095	5.0 - 5.5	< 2.0	0.9 ± 0.3	1.4 ± 0.7
4068	2095	5.5 - 6.0	< 2.0	0.8 ± 0.2	1.3 ± 0.5
4068	2095	6.0 - 6.5	< 2.0	0.9 ± 0.1	1.1 ± 0.4
4068	2095	6.5 - 7.0	2.3 ± 1.1	1.1 ± 0.3	1.6 ± 0.4
4068	2095	7.0 - 7.5	2.1 ± 1.4	0.8 ± 0.5	1.1 ± 0.3
4068	2095	7.5 - 8.0	3.9 ± 1.3	1.1 ± 0.2	1.6 ± 0.5
4068	2095	8.0 - 8.5	< 2.0	< 1.0	< 1.0
4068	2095	8.5 - 9.0	< 2.0	0.9 ± 0.2	1.4 ± 0.5
4068	2095	9.0 - 9.5	< 3.0	1.4 ± 0.2	1.3 ± 0.4
4068	2095	9.5 - 10.0	< 2.0	1.1 ± 0.3	1.4 ± 0.4
4068	2408	0.0 - 1.0	< 3.1	1.8 ± 0.1	7.7 ± 0.3
4068	2408	1.0 - 2.0	< 7.2	< 1.4	< 2.3
4068	2408	4.0 - 6.0	< 4.7	< 1.3	< 1.4
4068	2408	6.0 - 7.0	< 2.0	< 0.5	< 0.7
4068	2408	7.0 - 8.0	< 2.6	< 0.6	< 0.9
4068	2408	8.0 - 10.0	< 3.4	< 0.7	< 1.2

TABLE 5-1

(continued)

Page 4 of 7

Coordinates[a] East	Coordinates[a] North	Depth (ft)	Concentration (pCi/g ± 2 sigma) Uranium-238	Radium-226	Thorium-232
4075	2365	0.0 - 2.0	< 3.8	< 0.9	< 1.5
4075	2365	2.0 - 4.0	< 4.8	< 1.0	6.2 ± 0.4
4075	2365	5.0 - 6.0	< 3.0	< 0.6	< 1.0
4075	2365	6.0 - 6.5	< 4.6	< 1.2	< 1.6
4078	2482	0.0 - 2.0	< 4.8	< 0.9	< 1.6
4078	2482	4.0 - 5.0	< 2.9	< 0.7	< 1.1
4078	2482	5.0 - 6.0	< 3.5	< 0.8	< 1.4
4078	2482	6.0 - 7.0	< 4.6	< 1.3	< 1.7
4078	2482	7.0 - 8.0	< 2.9	< 0.8	< 1.2
4079	2273	0.0 - 2.0	< 1.8	< 0.5	< 0.7
4079	2273	3.0 - 4.0	< 3.8	< 1.0	< 1.6
4079	2273	6.0 - 7.0	< 3.8	< 1.0	< 1.4
4079	2273	7.0 - 8.0	< 6.4	< 1.4	< 2.0
4079	2273	8.0 - 10.0	< 1.8	< 0.5	1.7 ± 0.1
4094	2025	0.0 - 1.0	< 5.1	< 1.5	< 2.3
4094	2025	4.0 - 6.0	< 4.7	< 1.3	< 2.1
4094	2025	6.0 - 8.0	< 3.9	< 1.0	< 1.4
4094	2025	8.0 - 10.0	< 6.0	< 1.5	< 2.1
4117	2327	0.0 - 2.0	< 4.2	< 0.9	< 1.6
4117	2327	6.0 - 8.0	< 2.1	< 0.6	< 0.8
4138	2395	0.0 - 0.5	< 4.8	< 1.3	< 2.1
4138	2395	0.0 - 1.0	< 4.6	< 0.9	< 1.9
4138	2395	1.0 - 2.0	< 6.2	< 1.4	< 2.2

TABLE 5-1

(continued)

Page 5 of 7

Coordinates[a] East	Coordinates[a] North	Depth (ft)	Concentration (pCi/g ± 2 sigma) Uranium-238	Radium-226	Thorium-232
4138	2395	2.0 - 3.0	< 5.3	< 1.0	< 2.2
4138	2395	4.0 - 5.0	< 2.9	< 0.7	< 1.2
4138	2395	6.0 - 7.0	< 3.3	< 0.7	< 1.0
4138	2395	7.0 - 8.0	< 2.4	< 0.7	< 1.0
4144	2482	0.0 - 0.5	3.5 ± 0.7	< 0.6	< 0.7
4144	2482	0.0 - 2.0	< 3.3	< 0.9	< 1.4
4144	2482	4.0 - 6.0	< 4.5	< 1.0	< 1.8
4144	2482	6.0 - 8.0	< 2.2	< 0.5	< 0.8
4186	2433	0.0 - 0.5	< 5.2	< 0.9	< 1.3
4186	2433	0.0 - 2.0	< 2.3	< 0.5	< 0.9
4186	2433	5.0 - 6.0	< 5.6	< 1.0	< 1.6
4186	2433	8.0 - 10.0	< 2.6	< 0.5	< 0.8
4200	2351	0.0 - 0.5	< 6.1	< 0.8	< 2.0
4200	2351	0.0 - 2.0	< 1.2	< 1.7	11.9 ± 0.7
4200	2351	4.0 - 5.0	< 3.9	< 0.6	< 1.3
4200	2351	8.0 - 10.0	< 4.2	< 0.6	< 1.1
4217	2285	0.5 - 1.0	< 2.0	0.8 ± 0.3	0.7 ± 0.1
4217	2285	1.0 - 1.5	< 3.0	< 1.0	< 1.0
4246	2142	0.0 - 1.0	< 4.1	< 1.1	< 1.5
4246	2142	4.0 - 5.0	< 5.0	< 1.1	< 2.1
4246	2142	6.0 - 7.0	< 4.0	< 1.1	< 1.3
4246	2142	7.0 - 8.0	< 3.2	< 0.9	< 1.3
4246	2142	8.0 - 9.0	< 1.5	< 0.4	< 0.5

TABLE 5-1

(continued)

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Coordinates[a] East	Coordinates[a] North	Depth (ft)	Concentration (pCi/g ± 2 sigma) Uranium-238	Radium-226	Thorium-232
4257	2399	0.0 - 0.5	< 7.4	< 1.1	< 2.0
4257	2399	0.0 - 1.0	< 5.8	< 0.9	< 1.5
4257	2399	4.0 - 5.0	< 1.2	< 1.7	8.0 ± 0.2
4257	2399	5.0 - 6.0	< 7.0	< 0.9	7.3 ± 0.7
4257	2399	9.0 - 10.0	< 3.9	< 0.8	< 1.2
4267	2337	0.0 - 1.0	< 4.7	< 0.8	< 1.6
4267	2337	4.0 - 6.0	< 4.0	< 0.8	< 0.9
4267	2337	8.0 - 10.0	< 3.9	< 0.7	< 1.2
4269	2273	0.0 - 2.0	< 2.2	< 0.6	< 0.9
4269	2273	2.0 - 4.0	< 5.1	< 1.5	< 2.3
4269	2273	4.0 - 5.0	< 3.1	< 0.7	< 1.2
4269	2273	5.0 - 6.0	< 2.7	< 0.6	< 1.0
4269	2273	6.0 - 7.0	< 3.4	< 0.7	< 1.3
4269	2273	7.0 - 8.0	< 2.4	< 0.6	< 0.8
4269	2273	8.0 - 9.0	< 4.8	< 1.1	< 1.6
4269	2273	9.0 - 10.0	< 4.3	< 1.0	< 1.6
4269	2273	10.0 - 12.0	< 3.2	< 0.9	< 1.0
4276	455	0.0 - 0.5	< 8.7	< 1.4	< 2.1
4276	455	0.0 - 1.0	< 5.3	< 0.9	< 1.5
4276	455	3.0 - 4.0	< 6.8	< 1.0	< 1.9
4276	455	6.0 - 8.0	< 3.4	< 0.6	< 1.1
4296	2394	1.0 - 1.5	1.6 ± 1.6	0.7 ± 0.3	0.8 ± 0.2
4296	2394	1.5 - 2.0	< 2.0	< 1.0	< 1.0
4296	2394	2.0 - 2.5	< 2.0	< 1.0	0.8 ± 0.4

TABLE 5-1

(continued)

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Coordinates[a] East	Coordinates[a] North	Depth (ft)	Concentration (pCi/g ± 2 sigma) Uranium-238	Radium-226	Thorium-232
4296	2394	2.5 - 3.0	< 3.0	< 1.0	< 1.0
4296	2394	4.0 - 4.5	2.8 ± 2.8	1.1 ± 0.6	1.7 ± 0.5
4296	2394	4.5 - 5.0	< 2.0	0.7 ± 0.1	< 1.0
4296	2394	5.0 - 5.5	< 2.0	0.6 ± 0.1	0.7 ± 0.4
4296	2394	5.5 - 6.0	< 2.0	< 1.0	< 1.0
4296	2394	6.0 - 6.5	< 1.0	0.4 ± 0.1	0.5 ± 0.3
4296	2394	6.5 - 7.0	1.2 ± 1.0	0.4 ± 0.1	< 1.0
4296	2394	7.0 - 7.5	< 2.0	0.4 ± 0.1	0.6 ± 0.1
4296	2394	7.5 - 8.0	< 3.0	0.6 ± 0.3	1.0 ± 0.1
4300	2104	0.0 - 1.0	< 3.6	< 0.9	< 1.2
4300	2104	1.0 - 2.0	< 6.2	< 1.2	< 1.6
4300	2104	2.0 - 2.8	< 3.7	< 0.9	< 1.2
4300	2104	3.4 - 3.9	< 7.0	< 0.8	< 1.6
4329	2476	0.0 - 0.5	< 4.3	< 0.8	< 1.1
4329	2476	0.0 - 2.0	< 6.6	< 1.2	< 1.6
4329	2476	2.0 - 3.0	< 4.3	< 0.8	< 1.2
4329	2476	3.0 - 4.0	< 4.7	< 0.8	< 1.3
4329	2476	4.0 - 5.0	< 4.6	< 0.8	< 1.2
4329	2476	5.0 - 6.0	< 3.6	< 0.8	< 1.0
4329	2476	6.0 - 8.0	< 4.2	< 0.8	< 1.4

[a]Sampling locations are shown in Figure 4-2.

[b]No soil data was obtained for Borehole 1100R (E 3958, N 2152).

TABLE 5-2

DOWNHOLE GAMMA LOGGING RESULTS

FOR 160 AND 174 ESSEX STREET

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 1100R[d]			
3958	2152	0.5	10000
3958	2152	1.0	10000
3958	2152	1.5	9000
3958	2152	2.0	13000
3958	2152	2.5	13000
3958	2152	3.0	14000
3958	2152	3.5	15000
3958	2152	4.0	13000
3958	2152	4.5	14000
3958	2152	5.0	13000
3958	2152	5.5	13000
3958	2152	6.0	13000
3958	2152	6.5	13000
Borehole 1117R[d]			
3984	2215	0.5	7000
3984	2215	1.0	10000
3984	2215	1.5	11000
3984	2215	2.0	11000
3984	2215	2.5	10000
3984	2215	3.0	10000
3984	2215	3.5	10000
3984	2215	4.0	10000
3984	2215	4.5	10000
3984	2215	5.0	9000
3984	2215	5.5	10000
3984	2215	6.0	8000
3984	2215	6.5	8000
3984	2215	7.0	9000
3984	2215	7.5	10000
3984	2215	8.0	10000
Borehole 1086R[d]			
3988	2305	0.5	10000
3988	2305	1.0	14000
3988	2305	1.5	14000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 2051R[d]			
4019	2052	0.5	9000
4019	2052	1.0	10000
4019	2052	1.5	12000
4019	2052	2.0	11000
4019	2052	2.5	13000
4019	2052	3.0	12000
4019	2052	3.5	12000
4019	2052	4.0	13000
4019	2052	4.5	13000
4019	2052	5.0	12000
4019	2052	5.5	13000
4019	2052	6.0	13000
4019	2052	6.5	14000
4019	2052	7.0	16000
Borehole 1124R[d]			
4020	2347	0.5	12000
4020	2347	1.0	14000
4020	2347	1.5	18000
4020	2347	2.0	18000
4020	2347	2.5	16000
4020	2347	3.0	17000
4020	2347	3.5	14000
4020	2347	4.0	13000
4020	2347	4.5	12000
4020	2347	5.0	11000
4020	2347	5.5	10000
4020	2347	6.0	11000
4020	2347	6.5	11000
Borehole 1130R[d]			
4026	2079	0.5	36000
4026	2079	1.0	36000
4026	2079	1.5	36000
Borehole 1116R[d]			
4041	2147	0.5	6000
4041	2147	1.0	10000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 1116R (continued)[d]			
4041	2147	1.5	10000
4041	2147	2.0	10000
4041	2147	2.5	10000
4041	2147	3.0	12000
4041	2147	3.5	11000
4041	2147	4.0	10000
4041	2147	4.5	10000
4041	2147	5.0	7000
4041	2147	5.5	8000
4041	2147	6.0	10000
4041	2147	6.5	12000
4041	2147	7.0	12000
Borehole 2010R[d]			
4068	2095	0.5	8000
4068	2095	1.0	7000
4068	2095	1.5	8000
4068	2095	2.0	9000
4068	2095	2.5	12000
4068	2095	3.0	14000
4068	2095	3.5	15000
4068	2095	4.0	16000
4068	2095	4.5	16000
4068	2095	5.0	16000
4068	2095	5.5	16000
4068	2095	6.0	15000
4068	2095	6.5	15000
4068	2095	7.0	14000
4068	2095	7.5	13000
4068	2095	8.0	15000
4068	2095	8.5	15000
4068	2095	9.0	16000
4068	2095	9.5	16000
Borehole 1126R[d]			
4068	2408	0.5	12000
4068	2408	1.0	14000
4068	2408	1.5	18000
4068	2408	2.0	18000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 1126R (continued)[d]			
4068	2408	2.5	16000
4068	2408	3.0	17000
4068	2408	3.5	14000
4068	2408	4.0	13000
4068	2408	4.5	12000
4068	2408	5.0	11000
4068	2408	5.5	10000
4068	2408	6.0	11000
4068	2408	6.5	11000
Borehole 1125R[d]			
4075	2365	0.5	8000
4075	2365	1.0	10000
4075	2365	1.5	11000
4075	2365	2.0	12000
4075	2365	2.5	13000
4075	2365	3.0	17000
4075	2365	3.5	17000
4075	2365	4.0	15000
4075	2365	4.5	13000
4075	2365	5.0	10000
4075	2365	5.5	9000
Borehole 1127R[d]			
4078	2482	0.5	13000
4078	2482	1.0	17000
4078	2482	1.5	15000
4078	2482	2.0	13000
4078	2482	2.5	10000
4078	2482	3.0	11000
4078	2482	3.5	11000
4078	2482	4.0	11000
4078	2482	4.5	11000
4078	2482	5.0	11000
Borehole 1118R[d]			
4079	2273	0.5	7000
4079	2273	1.0	9000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 1118R (continued)[d]			
4079	2273	1.5	10000
4079	2273	2.0	12000
4079	2273	2.5	12000
4079	2273	3.0	13000
4079	2273	3.5	11000
4079	2273	4.0	11000
4079	2273	4.5	11000
4079	2273	5.0	11000
4079	2273	5.5	12000
4079	2273	6.0	12000
4079	2273	6.5	13000
Borehole 1122R[d]			
4094	2025	0.5	5000
4094	2025	1.0	5000
4094	2025	1.5	6000
4094	2025	2.0	8000
4094	2025	2.5	11000
4094	2025	3.0	11000
4094	2025	3.5	12000
4094	2025	4.0	12000
4094	2025	4.5	12000
4094	2025	5.0	12000
4094	2025	5.5	11000
Borehole 1123R[d]			
4117	2327	0.5	4000
4117	2327	1.0	9000
4117	2327	1.5	10000
4117	2327	2.0	10000
4117	2327	2.5	9000
4117	2327	3.0	11000
4117	2327	3.5	11000
4117	2327	4.0	11000
4117	2327	4.5	11000
4117	2327	5.0	11000
4117	2327	5.5	11000
4117	2327	6.0	12000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 1123R (continued)[d]			
4117	2327	6.5	12000
Borehole 1128R[d]			
4138	2395	0.5	11000
4138	2395	1.0	14000
4138	2395	1.5	16000
4138	2395	2.0	22000
4138	2395	2.5	29000
4138	2395	3.0	28000
4138	2395	3.5	15000
4138	2395	4.0	10000
4138	2395	4.5	10000
4138	2395	5.0	10000
4138	2395	5.5	10000
4138	2395	6.0	11000
4138	2395	6.5	10000
Borehole 1129R[d]			
4144	2482	0.5	5000
4144	2482	1.0	6000
4144	2482	1.5	9000
4144	2482	2.0	9000
4144	2482	2.5	11000
4144	2482	3.0	12000
4144	2482	3.5	12000
4144	2482	4.0	12000
4144	2482	4.5	12000
4144	2482	5.0	10000
Borehole 1167R[d]			
4186	2433	0.5	6000
4186	2433	1.0	8000
4186	2433	1.5	8000
4186	2433	2.0	9000
4186	2433	2.5	10000
4186	2433	3.0	11000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 1167R (continued)[d]			
4186	2433	3.5	11000
4186	2433	4.0	12000
4186	2433	4.5	13000
4186	2433	5.0	11000
4186	2433	5.5	10000
4186	2433	6.0	10000
4186	2433	6.5	10000
4186	2433	7.0	9000
4186	2433	7.5	9000
4186	2433	8.0	7000
4186	2433	8.5	6000
Borehole 1166R[d]			
4200	2351	0.5	41000
4200	2351	1.0	50000
4200	2351	1.5	41000
4200	2351	2.0	28000
4200	2351	2.5	16000
4200	2351	3.0	11000
4200	2351	3.5	11000
4200	2351	4.0	10000
4200	2351	4.5	9000
4200	2351	5.0	9000
4200	2351	5.5	9000
4200	2351	6.0	9000
4200	2351	6.5	10000
4200	2351	7.0	10000
4200	2351	7.5	9000
4200	2351	8.0	9000
4200	2351	8.5	9000
Borehole 2009R			
4217	2285	0.5	5000
4217	2285	1.0	6000
4217	2285	1.5	7000
4217	2285	2.0	6000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 1119R[d]			
4246	2142	0.5	4000
4246	2142	1.0	6000
4246	2142	1.5	10000
4246	2142	2.0	10000
4246	2142	2.5	11000
4246	2142	3.0	11000
4246	2142	3.5	4000
4246	2142	4.0	8000
4246	2142	4.5	8000
4246	2142	5.0	7000
4246	2142	5.5	7000
4246	2142	6.0	6000
Borehole 1168R[d]			
4257	2399	0.5	9000
4257	2399	1.0	10000
4257	2399	1.5	9000
4257	2399	2.0	9000
4257	2399	2.5	10000
4257	2399	3.0	10000
4257	2399	3.5	11000
4257	2399	4.0	18000
4257	2399	4.5	27000
4257	2399	5.0	31000
4257	2399	5.5	25000
4257	2399	6.0	32000
4257	2399	6.5	13000
4257	2399	7.0	10000
4257	2399	7.5	10000
4257	2399	8.0	10000
4257	2399	8.5	9000
4257	2399	9.0	8000
Borehole 1121R[d]			
4267	2337	0.5	5000
4267	2337	1.0	7000
4267	2337	1.5	11000
4267	2337	2.0	10000
4267	2337	2.5	13000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 1121R (continued)[d]			
4267	2337	3.0	13000
4267	2337	3.5	12000
4267	2337	4.0	10000
4267	2337	4.5	9000
4267	2337	5.0	10000
4267	2337	5.5	11000
4267	2337	6.0	10000
4267	2337	6.5	10000
4267	2337	7.0	10000
Borehole 1120R[d]			
4269	2273	0.5	5000
4269	2273	1.0	6000
4269	2273	1.5	5000
4269	2273	2.0	5000
4269	2273	2.5	5000
Borehole 1169R[d]			
4276	2455	0.5	7000
4276	2455	1.0	10000
4276	2455	1.5	11000
4276	2455	2.0	12000
4276	2455	2.5	12000
4276	2455	3.0	11000
4276	2455	3.5	10000
4276	2455	4.0	9000
4276	2455	4.5	10000
4276	2455	5.0	10000
4276	2455	5.5	10000
4276	2455	6.0	12000
Borehole 2008R			
4296	2394	0.5	6000
4296	2394	1.0	8000
4296	2394	1.5	12000
4296	2394	2.0	16000
4296	2394	2.5	31000
4296	2394	3.0	43000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 2008R (continued)			
4296	2394	3.5	31000
4296	2394	4.0	19000
4296	2394	4.5	16000
4296	2394	5.0	12000
4296	2394	5.5	10000
4296	2394	6.0	10000
4296	2394	6.5	9000
4296	2394	7.0	9000
4296	2394	7.5	9000
4296	2394	8.0	10000
4296	2394	8.5	10000
4296	2394	9.0	9000
4296	2394	9.5	9000
4296	2394	10.0	9000
Borehole 1087R			
4300	2104	0.5	6000
4300	2104	1.0	7000
4300	2104	1.5	11000
4300	2104	2.0	11000
4300	2104	2.5	12000
4300	2104	3.0	11000
4300	2104	3.5	12000
4300	2104	4.0	12000
4300	2104	4.5	13000
Borehole 1171R[d]			
4329	2476	0.5	6000
4329	2476	1.0	8000
4329	2476	1.5	8000
4329	2476	2.0	10000
4329	2476	2.5	11000
4329	2476	3.0	11000
4329	2476	3.5	10000

TABLE 5-2

(continued)

Coordinates[a] East	Coordinates[a] North	Depth[b] (ft)	Count Rate[c] (cpm)
Borehole 1171R (continued)[d]			
4329	2476	4.0	10000
4329	2476	4.5	11000
4329	2476	5.0	12000
4329	2476	5.5	12000
4329	2476	6.0	12000

[a]Borehole locations are shown in Figure 4-1.

[b]The variations in depths of boreholes and corresponding results given in this table are based on the boreholes penetrating the contamination or the drill reaching refusal.

[c]Instrument used was 5.0- by 5.0-cm (2- by 2-in.) thallium-activated sodium iodide gamma scintillation detector.

[d]Bottom of borehole collapsed.

TABLE 5-3
GAMMA RADIATION EXPOSURE RATES

FOR 160 AND 174 ESSEX STREET

Coordinates[a]		Rate[b]
East	North	(μR/h)
4000	2250	5
4000	2350	5
4100	2100	6
4100	2400	6
4100	2450	8
4150	2250	8
4225	2100	7
4250	2450	5

[a]Measurement locations are shown in Figure 4-3.

[b]Measurements include background.

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APPENDIX A

GEOLOGIC DRILL LOGS FOR 160 AND 174 ESSEX STREET

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1117R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,215 E 3,984	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-5-87	11-5-87	E.D.I.	MOBILE B-57	6.5"	8.1	1.9	10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
7.4/74		5			▽ / ▼ /	8.1/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS / % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION
SS	2.0	1.5	9-15-9 8								0.0 - 0.3 Ft. Silty GRAVEL FILL (GM). Broken basalt gravel.
SS	2.0	1.4	5-5-5 13								0.3 - 3.0 Ft. SAND and CLAY (SM, CL). Dark grayish brown (10YR4/2) and gray, very fine-grained, finely interbedded.
SS	2.0	1.4	2-13-27 27					5			0.3-2.6 Ft. SAND, 1-3 mm yellowish brown (10YR5/6) and black (N1) laminae.
SS	2.0	1.8	10-13 18-21								2.6-3.0 Ft. Interbeds of dark gray and gray (10YR5/1) clay.
SS	2.0	1.3	9-15 35-80								3.0 - 8.1 Ft. SAND (SM-SP). Fine- to very fine-grained, silty in places, some interbedded silt.
								10			3.0-4.3 Ft. Dark gray (10YR4/1), damp.
											4.3-6.0 Ft. Dark grayish brown (2.5Y4/2), silty, hard but crumbles with finger pressure.
											6.0-6.3 Ft. Greenish gray, wet.
											6.7-7.3 Ft. SILT, dark yellowish brown (10YR4/4), some sand interbeds.
											7.3-8.1 ft. SAND, dark brown (7.5YR4/2), clayey toward base.
											8.1 - 10.0 ft. BEDROCK. Dark reddish brown (5YR3/2) New Brunswick sandstone, hard, fractured.
											Bottom of borehole at 10.0 Ft. Borehole backfilled with spoils, 11/5/87.

NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.

Borehole advanced 0-10 Ft. with 6.5" o.d. hollow stem auger.
Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.

ENMET reads 300 ppm at 1.0 Ft. when hole is 6.0 Ft. deep.

Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO. 1117R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1086R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex Ave. (LODI)	N 2,305 E 3,988	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-5-87	11-6-87	G. Engel; BNI	Minuteman Auger	4"	15.1		15.1

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
14.3/94		18			▽ /	/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
N/A	NONE	R. Migues

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE
SS	1.0	0.6								
SS	1.2	1.2								
SS	0.2	0.2								
SS	0.1	0.1								
SS	0.7	0.7								
SS	1.0	1.0								
SS	0.8	0.8								
SS	1.3	1.2						5		
SS	0.5	0.5								
SS	1.0	1.0								
SS	0.6	0.6								
SS	1.0	1.0								
SS	1.0	1.0						10		
SS	1.0	1.0								
SS	0.8	0.8								
SS	1.0	1.0								
SS	1.0	0.7								
SS	0.8	0.8						15		

DESCRIPTION AND CLASSIFICATION

0.0 - 3.0 Ft. Silty Sandy CLAY (CL-ML). Very dusky red (10R2/2). Fine- to medium-grained, with pebbles and gravel-sized clasts of volcanic (?) rock.

2.2-2.6 Ft. Dusky yellowish brown (10YR2/2).

3.0 - 3.9 Ft. Silty CLAY (CL-ML). Moderate red (5R4/6).

3.3-3.9 Ft. Brownish black (5YR2/1).

3.9 - 5.1 Ft. Sandy Silty CLAY (CL-ML). Dark yellowish brown (10R4/2).

5.1 - 6.4 Ft. Clayey SILT (ML-CL). Pale brown (5YR5/2) mottled with light brown (5YR6/4) and specks of dusky yellowish brown (10YR2/2).

6.4 - 11.0 Ft. SILT (ML). Moderate brown (5Y4/4).

7.3-11.0 Ft. Grayish red (10R4/2) with flecks of brownish black (5YR2/1).

11.0 - 11.7 Ft. Silty SAND (SM). Moderate red (5R4/6), very fine- to coarse-grained.

11.7 - 13.7 Ft. SAND (SW). Moderate red (5R4/6). Very fine- to medium-grained with slight silt.

13.7 - 14.8 Ft. Pebbly SAND (SG). Moderate red (5R4/6) fine- to medium-grained sand with small pebbles of greenish black (5G2/1) siltstone.

14.8 - 15.1 Ft. Clayey Silty SAND (SM). Dark reddish brown (10R3/4). Fine- to coarse-grained with pebbles.

Bottom of borehole at 15.1 Ft.
Borehole backfilled with spoils, 11/6/87.

NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.

Borehole advanced 0-15.1 Ft. using 3" i.d. split-spoon sampler and 4" o.d. solid stem augers.

Borehole was radiologically sampled and gamma-logged by TMA-Eberline, Corp.

Augered to 2.0 Ft. Gamma-scanned to 1.5 Ft.

Auger refusal at 1.5-2.0 Ft. after several attempts and shearing the auger bolts. Abutting pavement?

Description and classification of soils by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex Ave. (LODI)

HOLE NO. 1086R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	2051R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
Nat'l Guard Armory (LODI)	N 2,052 E 4,019	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-16-88	11-16-88	EMPIRE SOILS	ACKER AD-II	3"	4.5	3.5	8.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
7.0/88		4			▼ /	4.5/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
300 lbs./ 24 in.	NONE	J. Lord

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.0	3-6-7-9								0.0 - 1.0 Ft. TOPSOIL. Blackish red (5R2/2) to dusky red (5R3/4). Organics, roots, silty sand, and some clay.	Borehole advanced 0-8 Ft. using 3 in. i.d. split-spoon samplers. Sampled and gamma-logged by TMA-Eberline, Inc.
SS	2.0	2.0	7-8-9 19								1.0 - 4.5 Ft. Silty SAND (SM). Light brown (5YR6/4). Dry, loose, poorly sorted material. No bedding. Some gravel. No cohesion, no odor.	
SS	2.0	2.0	17-31 42-56					5			4.5 - 8.0 Ft. SANDSTONE. Dark reddish brown (10R3/4). Mostly weathered, compact but crumbly Brunswick sandstone. Very slightly moist to dry. Compact, dense, slightly brittle. Undisturbed material.	No groundwater observed.
SS	2.0	2.0	52-38 47-50								Bottom of borehole at 8.0 Ft. Borehole backfilled with spoils, 11/16/88.	Top of undisturbed soil (bedrock?) at 4.5 Ft.
												Description and classification of soils by visual examination of samples.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: Nat'l Guard Armory (LODI)

HOLE NO. 2051R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1124R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,347 E 4,020	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-9-87	11-9-87	E.D.I.	MOBILE B-57	6.5"	6.4	1.6	8.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
4.8/60		4			▽ / 11/9/87	6.4/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.0	13-6-2-3							0.0 - 4.3 Ft. Silty GRAVEL and Gravelly SILT FILL (GM).	Borehole advanced 0-8 Ft. with 6.5" o.d. hollow stem auger.
SS	2.0	0.7	1-2-2-2							0.0-0.6 Ft. Silty GRAVEL, broken basalt gravel, black silt.	
SS	2.0	1.5	2-10-12 12					5		0.6-4.3 Ft. Gravelly SILT, gray (5YR5/1), with soft silt pebbles, grayish brown and yellowish brown, round gravel, and pieces of charcoal.	Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	1.6	12-13 28-28							4.3 - 6.4 Ft. SAND (SP). Dark gray (10YR4/1) with slight greenish tint, fine-grained, saturated at top, iron-oxide stained at base.	6.0 Ft. Groundwater observed.
										6.4 - 8.0 Ft. WEATHERED BEDROCK. Dusky red (10R3/6) sandstone, some coarse grayish brown sand. Becomes harder downward. New Brunswick sandstone.	At TD, ENMET reads 100 ppm toxic with probe at 1.0 Ft.
										Bottom of borehole at 10.0 Ft. Borehole backfilled with spoils, 11/9/87.	
											Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1124R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1130R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,079 E 4,026	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-8-87	11-9-87	E.D.I.	MOBILE B-57	6.5"	2.5	2.2	4.7

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
2.3/49		3			▽ / ▼ /	2.5/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. p.s.i.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.8	26-29 36-33								0.0 - 2.5 Ft. SAND and Silty GRAVEL FILL (SP, GM).	Borehole advanced 0-4.7 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0		17-27 28-33								0.0-1.5 Ft. Silty GRAVEL, dark brown silt, broken basalt and other rock gravel.	
SS	0.7	0.5	13-50/2"								1.5-2.5 Ft. SAND, yellowish red (5YR4/6) on top, yellowish brown and weak red below; very fine-grained.	
											2.5 - 4.7 Ft. WEATHERED BEDROCK. Dusky red decomposed New Brunswick sandstone; hardens downward.	2" of asphalt at surface.
											Bottom of borehole at 4.7 ft. Borehole backfilled with spoils, 11/8/87.	Auger refusal at 4.7 ft.
												Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO. 1130R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1116R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,147 E 4,041	Vertical	-------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-5-87	11-5-87	E.D.I.	MOBILE B-57	6.5"	8.2	3.6	11.8

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
5.1/43		6			▽ /	8.4/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	0.9	10-11 16-17								0.0 - 4.3 Ft. GRAVEL and Gravelly SILT FILL (GP, GM-ML).	Borehole advanced 0-11.8 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp. 3.1-4.3 Ft. Faint chemical odor.
SS	2.0	1.4	9-4-6 12								0.0-2.4 Ft. GRAVEL, coarse-grained angular broken basalt with minor dark brown silt.	
SS	2.0	1.3	3-15 22-25					5			2.4-2.5 Ft. SILT, black (5YR2.5/1).	
SS	2.0	0.0	31-23-33 25/1"								2.5-3.1 Ft. SILT, gray (5YR5/1) with minor gravel.	
SS	2.0	1.5	31-36 32-33								3.1-4.3 Ft. SILT, grayish brown (10YR5/2) and greenish gray with minor New Brunswick sandstone gravel.	
SS	1.8	0.0	9-15-58 50/3"					10			4.3 - 8.2 Ft. SAND (SP-SC). Fine-grained.	8-10 Ft. Sample is wet.
											4.3-4.9 Ft. Grayish brown (2.5Y5/2), very fine-grained with thin laminae of dark brown sand.	
											4.9-6.7 Ft. Very dark gray (5YR3/Y), fine-grained, wet.	
											6.7-8.0 Ft. Clayey SAND.	
											8.0-8.2 ft. SAND, reddish brown (2.5YR4/4), fine-grained, liquified.	
											8.2 - 11.8 ft. BEDROCK, reddish brown (2.5YR4/4), hard, New Brunswick Sandstone; top 0.2 Ft. is clayey.	
											Bottom of borehole at 11.8 Ft. Borehole backfilled with spoils, 11/5/87.	Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO.: 1116R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	2010R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,095 E 4,068	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
10-7-88	10-7-88	EMPIRE SOILS	CME 45B	12"	10.0		10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
8.1/90		5			▽ 9.0/ 10/7/88	/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
300 lbs./ 24 in.	NONE	J. Lord

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
											0.0 - 1.5 Ft. ASPHALT & GRAVEL. Nat'l. Comm. Bank driveway.	Borehole advanced 0-10 Ft. using 6 1/4" i.d. hollow stem augers.
SS	1.0	1.0	25-22								1.5 - 10.0 Ft. WEATHERED SANDSTONE. Dark reddish brown (10R3/4) New Brunswick formation.	
SS	2.0	2.0	25-29 43-29								1.5-2.0 Ft. Mostly weathered, compact but crumbley silty sand. Slightly moist.	
SS	2.0	1.7	12-15 20-28					5			2.0-8.0 Ft. Grading from weathered, fractured sandstone soil, to a competent sandstone rock. Substantial 3" chunks of hard sandstone in the spoons.	Radiologically sampled and gamma-logged by TMA-Eberline, Inc. Groundwater detected, 9.0 Ft.
SS	2.0	1.4	8-12-12 20								7.0-8.0 Ft. Layer of weathered sandstone, and limestone gravel. Angular limestone chunks up to 1" in diameter.	
SS	2.0	2.0	15-22 38-49					▽			9.0 Ft. Saturated.	
								10			Bottom of borehole at 10.0 Ft. Borehole backfilled with spoils to 6" and asphalt to the surface, 10/7/88.	1.5 Ft. Top of undisturbed soil.
												Description and classification of soils by visual examination of samples.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO.: 2010R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1126R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,408 E 4,068	Vertical	-------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-9-87	11-9-87	E.D.I.	MOBILE B-57	6.5"	8.4	1.6	10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
5.2/52		5			/	8.4/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. p.s.i.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.3	5-11-7 6								0.0 - 4.3 Ft. Gravelly SILT FILL (GM-ML). 0.0-0.7 Ft. Mixed dark brown (10YR3/3) and dark gray. 0.7-4.3 Ft. Mixed dark brown (10YR3/3), reddish brown (2.5YR4/4) and dark gray SILT, pieces of wood, dusky red New Brunswick sandstone, soft reddish brown silt pebbles, and other gravel.	Borehole advanced 0-10 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	0.0										
SS	2.0	0.8	4-4-8 15					5			4.3 - 6.3 Ft. SAND (SP) Dark reddish gray (5YR4/2), fine- to medium-grained, minor silt, rare round gravel.	At TD, ENMET reads 300 ppm, 2 bars LEL with probe at 0.5 Ft.
SS	2.0	2.0	16-17 18-17								6.3 - 8.4 Ft. Clayey SAND (SC). Grayish brown (10YR5/2), medium-grained, some clay. 6.3-6.6 Ft. CLAY. 8.0-8.4 Ft. Clayey SAND.	
SS	2.0	1.1	19-22 37-42					10			8.4 - 10.0 Ft. WEATHERED BEDROCK, dusky red, fractured weathered New Brunswick sandstone.	
											Bottom of borehole at 10.0 ft. Borehole backfilled with spoils, 11/9/87.	Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1126R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1125R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,365 E 4,075	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-9-87	11-9-87	E.D.I.	MOBILE B-57	6.5"	6.5	0.2	6.7

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
4.4/66		4			▽ 4.9/ 11/9/87	6.5/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	0.8	7-7-10 6								0.0 - 4.9 Ft. Silty GRAVEL and Gravelly SILT FILL (GM).	Borehole advanced 0-6.7 Ft. with 6.5" o.d. hollow stem auger.
SS	2.0	1.2	3-2-1-4								0.0-0.7 Ft. Broken basalt gravel, brown silt.	Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	1.8	25-28 28-25					▽ 4.9		S	0.7-2.5 Ft. Gravelly SILT, dark brown (7.5YR5/2), pebbles of soft yellowish brown silt and hard dusky red New Brunswick sandstone, damp.	4.9 Ft. Groundwater observed.
SS	0.6	0.6	50-25/0"								2.5-4.9 Ft. Dusky red New Brunswick sandstone gravel fixed in weathered clay and silt (FILL?).	Auger refusal at 6.7 Ft.
											4.9 - 6.5 Ft. SAND (SP). Grayish brown (10YR5/2), fine-grained, medium-grained toward top, wet. (Brook sediments?)	
											6.5 - 6.7 Ft. BEDROCK. Dusky red, hard New Brunswick	
											Bottom of borehole at 6.7 Ft. Borehole backfilled with spoils, 11/9/87.	
												Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1125R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1127R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,482 E 4,078	Vertical	-------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-9-87	11-9-87	E.D.I.	MOBILE B-57	6.5"	6.8	1.2	8.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
5.2/65		4			▽ /	6.8/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in.	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION
SS	2.0	1.1	7-4-4-5								0.0 - 4.4 Ft. Gravelly SILT FILL and Silty SAND (GM-ML, SM).
SS	2.0	1.4	2-3-1-6								0.0-0.3 Ft. Silty GRAVEL, black silt, broken basalt gravel.
SS	2.0	1.4	4-6-18 16								0.3-2.8 Ft. Gravelly SILT, silt is black and dark brown, pebbles of soft red silt, pieces of wood, coal ash.
SS	2.0	1.3	23-34 50/2"					5			2.8-4.4 Ft. Silty SAND, reddish gray (5YR4/2), fine-grained, small (< 1 cm) pieces of decomposed wood, some reddish brown slightly decomposed New Brunswick sandstone gravel.
											4.4 - 6.0 Ft. Clayey SILT (ML-CL). Reddish brown (5YR5/3) with yellowish brown iron-oxide stain, grayish green on top.
											6.0 - 6.8 Ft. SILT and SAND (ML-OL, SP). Greenish gray sand, yellowish brown silt.
											6.5-6.6 Ft. SILT, black, organic.
											6.8 - 8.0 Ft. WEATHERED BEDROCK. Dusky red New Brunswick sandstone, becomes harder downward.
											Bottom of borehole at 8.0 Ft. Borehole backfilled with spoils, 11/9/87.

NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.

Borehole advanced 0-8 Ft. with 6.5" o.d. hollow stem auger.

Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.

Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1127R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1118R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,273 E 4,079	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-5-87	11-5-87	E.D.I.	MOBILE B57	6.5"	8.0	2.0	10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
4.7/47		5			▽ 8.0/ 11/5/87 /	8.0/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	0.3	15-17-8 12								0.0 - 6.6 Ft. Silty GRAVEL and SILT FILL (GM, ML).	Borehole advanced 0-10 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	1.9	5-13-13 14								0.0-2.1 Ft. Silty GRAVEL, black broken basalt gravel; loose, slightly damp.	
SS	2.0	0.3	4-7-9-9					5			2.1-6.6 Ft. SILT, weak red (2.5Y4/2) and light brown (7.5YR6/4) some sub-rounded soft pebbles, yellowish brown and reddish brown; few pieces of hard dark red New Brunswick sandstone.	ENMET reads 100 ppm at 0.5 Ft. when hole is 8.0 Ft. deep.
SS	2.0	1.5	4-6-7-8								6.6 - 8.0 Ft. SILT (ML). Weak red (2.5YR4/2), few small pebbles.	
SS	2.0	0.7	14-18-18 25/1"								8.0 - 10.0 Ft. WEATHERED SHALE BEDROCK. Dusky red (2.5YR3/2), hard, New Brunswick formation.	8.0 Ft. Groundwater observed.
											Bottom of borehole at 10.0 ft. Borehole backfilled with spoils, 11/5/87.	

Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO.: 1118R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1122R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,025 E 4,094	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-6-87	11-6-87	E.D.I.	MOBILE B-57	6.5"	4.0	6.0	10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
6.1/61		5			▽ /	4.0/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS / % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.6	26-20 / 15-14								0.0 - 0.3 Ft. Silty GRAVEL FILL (GM). Broken basalt gravel, loose, caves in easily; silt is black.	Borehole advanced 0-10 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	1.5	10-23 / 16-17								0.3 - 4.0 Ft. SILT (ML). Weak red and yellowish brown iron-oxide mottling, some round gravel.	
SS	2.0	0.9	50-46 / 29-34					5			4.0 - 10.0 Ft. WEATHERED BEDROCK. Dusky red to red, silty sand, fine- to very fine-grained. Variably weathered and hard New Brunswick sandstone.	
SS	2.0	1.4	7-14-13 / 12								6.0-8.0 Ft. Gravelly sandstone; weak red, fine-grained.	6-10 Ft. Drills like weathered bedrock. 7.7-8.0 Ft. Soft.
SS	2.0	0.7	9-24-9 / 5								8.0-10.0 F.ft. Clayey sandstone; weak red, fine-grained, moist.	
											Bottom of borehole at 10.0 ft. Borehole backfilled with spoils, 11/6/87.	Hole caved in to 5.0 Ft.
												Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO.: 1122R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1123R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,327 E 4,117	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-6-87	11-6-87	E.D.I.	MOBILE B-57	6.5"	4.0	4.0	8.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
3.1/39		4			▽ /	4.0/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS / % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION
SS	2.0	0.8	14-42 13-15								0.0 - 2.0 Ft. Silty GRAVEL FILL (GM). Broken basalt gravel; silt is dark brown. 0.4 Ft. Yellow powder distributed in fill.
SS	2.0	0.8	1-3-7 12								2.0 - 4.0 Ft. SILT and Silty SAND (ML, SM). Silt is reddish brown; sand is gray, medium-grained.
SS	2.0	0.8	15-17 17-17					5			4.0 - 8.0 Ft. WEATHERED BEDROCK. Dusky red sandstone, hard, clayey at top, damp at base. New Brunswick sandstone.
SS	2.0	0.7	9-11 38-40								
											Bottom of borehole at 8.0 ft. Borehole backfilled with spoils, 11/6/87.

NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.

Borehole advanced 0-8 Ft. with 6.5" o.d. hollow stem auger.

Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.

Hole is dry.

Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1123R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1128R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,395 E 4,138	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-9-87	11-9-87	E.D.I.	MOBILE B-57	6.5"	7.5	0.5	8.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
6.3/79		4			▽ / ▼ /	7.5/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS / % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.5	15-11-7 7								0.0 - 5.7 Ft. SILT and Gravelly SILT FILL (ML, ML-GL).	Borehole advanced 0-8 Ft. with 6.5" o.d. hollow stem auger.
SS	2.0	1.5	3-4-5-4								0.0-0.4 Ft. Silty GRAVEL, black silt, broken basalt gravel.	Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	1.3	3-4-16 23					5			0.4-2.0 Ft. Gravelly SILT, black (2.5YR2.5/0), with pieces of wood, dusky red New Brunswick sandstone, other rock.	
SS	2.0	2.0	17-21 22-26								2.0-5.7 Ft. SILT, black, small pieces of greenish gray silt, minor coarse-grained round sand, medium-grained reddish gray silty sand mixed in.	6.0 Ft. ENMET reads 300 ppm with probe at top of hole.
											4.0-5.0 Ft. Green stain.	
											5.7 - 7.5 Ft. SAND (SP).	
											5.7-6.9 Ft. Reddish gray (5YR5/2), fine-grained, saturated, runny.	Borehole is dry.
											6.9-7.5 Ft. Yellowish brown (10YR5/6), fine-grained.	
											7.5 - 8.0 Ft. WEATHERED BEDROCK. Dusky red, New Brunswick sandstone, hard pieces separated by more weathered soft clayey areas.	
											Bottom of borehole at 8.0 Ft. Borehole backfilled with spoils, 11/9/87.	Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1128R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1129R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,482 E 4,144	Vertical	-------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-9-87	11-9-87	E.D.I.	MOBILE B-57	6.5"	8.0		8.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
5.3/66		4			▽ 6.0/ 11/9/87	/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	0.9	9-9-6-3								0.0 - 2.4 Ft. SAND and Silty GRAVEL FILL (SP, GM).	Borehole advanced 0-8 Ft. with 6.5" o.d. hollow stem auger.
SS	2.0	1.8	2-3-2-3								0.0-0.4 Ft. Silty GRAVEL, dark brown silt, angular basalt gravel.	Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	0.8	10-18-18 17					5			0.4-2.4 Ft. SAND, brown (7.5YR5/4), fine-grained.	
SS	2.0	1.8	15-20 23-31								2.4 - 6.0 Ft. Silty SAND and Sandy SILT (SM, ML). 2.4-4.0 Ft. Reddish brown (2.5YR4/4), some plant pieces, roots, decomposed organic material, bedding present.	6.0 Ft. Groundwater observed.
											4.0-6.0 Ft. Dusky red (7.5YR3/2), decomposed New Brunswick formation.	
											6.0 - 8.0 Ft. SAND (SP). Dark grayish brown (10YR4/2), fine-grained, compacted, wet.	
											6.3-6.5 Ft. Medium-grained.	
											Bottom of borehole at 8.0 Ft. Borehole backfilled with spoils, 11/9/87.	Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1129R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1167R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,433 E 4,186	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-24-87	11-24-87	E.D.I.	Mobile B-57	6.5"	10.0		10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
4.8/48		5			▽ 8.0/ 11/24/87	

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs./ 30 in.	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS X CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	0.8	7-14-8 4								0.0 - 4.6 Ft. Gravelly SILT, SILT FILL (ML-GL, ML-OL).	Borehole advanced 0-10 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp. 2" of asphalt at surface. Hole caved in to 8.5 Ft.
SS	2.0	1.3	3-5-4-4								0.0-2.6 Ft. Gravelly SILT, dark brown (7.5YR3/4); gravel is New Brunswick sandstone, basalt, and concrete.	
SS	2.0	1.4	2-7-10 22					5			2.6-2.9 Ft. SILT and Silty SAND, horisontally interlayered gray fine-grained silty sand, reddish gray very fine-grained silty sand and black silt.	
SS	2.0	0.0	19-36 25-16								2.9-4.6 Ft. SILT, black.	
SS	2.0	1.3	5-9-7 12								4.6 - 6.0 Ft. Silty SAND (SM). Dark grayish brown (10YR4/2), fine-grained.	8.0 Ft. Groundwater observed.
								10			6.0 - 8.0 Ft. SILT (ML). Dark gray (5YR4/1).	
											8.0 - 10.0 Ft. Silty SAND (SM). Weak red (2.5YR5/2), fine-grained, subangular grains, saturated.	Drager tube poly-test positive with hole to TD.
											bottom of borehole at 10.0 Ft. Borehole backfilled with spoils, 11/24/87.	

Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1167R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1166R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,351 E 4,200	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-24-87	11-24-87	E.D.I.	Mobile B-57	6.5"	10.0		10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
4.2/42		5			▽ 8.2/ 11/24/87	

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs./30 in.	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.0	8-8-6-7								0.0 - 3.2 Ft. Silty GRAVEL, Gravelly SILT and SILT FILL (GM, GM-ML, OL).	Borehole advanced 0-10 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	1.5	1-2-4 12								0.0-2.0 Ft. Silty GRAVEL, broken pieces of basalt, cement and New Brunswick sandstone.	
SS	2.0	1.7	3-3-7-4								2.0-2.7 Ft. Gravelly SILT, black, pieces of soft silt, grayish green, brownish gray.	
SS	2.0		9-11-12 11					5			2.7-3.2 Ft. SILT, black, soft.	Elevated readings with HP-260 from 2.7-3.2 Ft.
SS	2.0		2-2-8-8								3.2 - 4.9 Ft. Silty SAND and SILT (SM, ML). Grayish green, fine-grained, some medium-grained sand, beds are 0.3 ft. thick; sand and silt is interbedded.	8.2 Ft. Groundwater observed.
								10			4.9 - 10.0 Ft. Silty SAND and SAND (SM, SP). Reddish gray (5YR5/2), becoming brown downward, fine- to medium-grained, some gravel of New Brunswick sandstone.	At TD, ENMET reads 90 ppm, 1 bar LEL with probe at 0.5 Ft.
											5.8 Ft. Some coarse-grained sand.	
											6.3-6.4 Ft. SILT, greenish gray.	
											6.4-8.2 Ft. Silty SAND, brown (10YR4/3); may be disturbed fill.	
											8.2-10 Ft. SAND, brown (10YR4/2), very fine-grained bedding evident, saturated.	
											Bottom of borehole at 10.0 Ft. Borehole backfilled with spoils, 11/24/87.	Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1166R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	2009R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,285 E 4,217	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
10-7-88	10-7-88	EMPIRE SOILS	CME 45B	12"	2.1		2.1

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
1.0/63		1			/	/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
300 lbs./ 24 in.	NONE	J. Lord

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	1.5	1.0	20-30-75								0.0 -1.5 Ft. ASPHALT & GRAVEL. Nat'l Comm. Bank driveway.	Borehole advanced 0-2.1 Ft. using 6 1/4" i.d. hollow stem augers.
SS	0.1	0.0	100/1"								1.5 - 2.0 Ft. GRAVEL (G). Driveway base of large angular limestone to 3" in diam.	
											2.0 - 2.1 Ft. SANDSTONE. New Brunswick formation.	Radiologically sampled and gamma-logged by TMA-Eberline, Inc. No groundwater detected.
											Bottom of borehole at 2.1 Ft. Borehole backfilled with spoils to 6", and asphalt to the surface, 10/7/88.	Top of undisturbed soil 2.1 Ft.
												Spoon & auger refusal at 2.1 Ft. Bedrock.
												Description and classification of soils by visual examination of samples.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO.: 2009R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1119R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,142 E 4,246	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-5-87	11-5-87	E.D.I.	MOBILE B-57	6.5"	10.0		10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
7.3/80		5			▽ / 11/5/87	

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.6	21-25 25-24								0.0 - 6.0 Ft. Silty GRAVEL and SAND (GM,SM,SP).	Borehole advanced 0-10 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	1.9	13-13 17-15								0.0-1.0 Ft. Silty GRAVEL, broken basalt gravel, reddish brown silt.	
SS	2.0	1.7	8-15-13 17								1.0-2.0 Ft. Silty SAND (SM), pale yellow (2.5Y7/4), very fine-grained, some iron-oxide stained roots.	
SS	2.0	1.8	7-12-14 19					5			2.0-6.0 Ft. SAND (SP), yellowish brown (10YR5/6), fine-grained, some gravel, poorly compacted, dry.	ENMET reads 300 ppm/1 bar LEL at 0.5 Ft.; hole is 8.0 Ft. deep.
SS	1.0	0.3	15-35 35/0"								5 Ft. Some gravel.	
											6.0 - 6.3 Ft. Clayey SILT (ML-CL). Light brown (7.5YR6/4).	8.0 Ft. Groundwater observed.
											6.3 - 9.0 Ft. SAND (SP). Brown (7.5YR5/2), fine-grained, wet.	Hole caved in to 6.0 Ft.
											Bottom of borehole at 9.0 Ft. Borehole backfilled with spoils, 11/5/87.	
												Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO.: 1119R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1168R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,399 E 4,257	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-24-87	11-24-87	E.D.I.	Mobile B-57	6.5"	10.0		10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
8.1/81		5			8.7/ 11/24/87	/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs./ 30 in.	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.7	9-25 40-26								0.0 - 6.5 Ft. Gravelly SILT, Silty GRAVEL and SAND FILL (ML-GM, GM, SP). 0.0-3.9 Ft. Gravelly SILT, dusky red (10RS/2) decomposed New Brunswick sandstone and shale matrix, silt and very-fine sand; gravel is broken pieces of New Brunswick sandstone. 1.1-1.4 Ft. Piece of lumber. 2.0-3.9 Ft. Some dark gray and brown silt, some round gravel.	Borehole advanced 0-10 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp. 2" of asphalt at surface. Elevated readings with HP-260 from 6.0-6.5 Ft.
SS	2.0	1.8	12-17 18-18									
SS	2.0	1.7	3-4-4 12					5				
SS	2.0	1.3	14-15 12-13								3.9-4.1 Ft. SAND, gray, fine-grained, clean.	
SS	2.0	1.6	6-10-10 14								4.1-5.9 Ft. SILT, dark grayish brown to black, pieces of grayish green, reddish brown and grayish brown silt mixed in. 5.9-6.0 Ft. SAND, black, fine-grained, damp. 6.0-6.5 Ft. Silty SAND, dark gray, some black sand mixed in, some pea gravel, grayish green silt pieces.	With augers in the hole to 8.0 Ft., ENMET reads 100 ppm at surface. 8.7 Ft. Groundwater observed.
								10			6.5 - 7.8 Ft. Silty SAND (SM). Weak red (5R4/3), fine- to medium-grained. 7.8 - 8.7 Ft. SILT (ML). Dark yellowish brown (10YR4/4), weakly laminated. 8.7 - 10 Ft. SAND (SP). Dark grayish brown (10YR4/2), fine-grained, saturated 9.2-9.5 Ft. Brown (10YR4/3), very fine-grained. Bottom of borehole at 10.0 ft. Borehole backfilled with spoils, 11/24/87.	At TD, ENMET reads >300 ppm, >10% LEL with probe at 0.5 Ft. Drager tube poly-test showed very minor positive at top of hole after TD. Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1168R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1120R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,273 E 4,269	Vertical	-------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-6-87	11-6-87	E.D.I.	MOBILE B-57	6.5"	14.0		14.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
4.1/34		6			▽ 10.9/ 11/6/87	

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs/30 in	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	0.3	25-21 22-15								0.0 - 4.3 Ft. Silty GRAVEL and SAND FILL (GM, SP). Broken basalt gravel with black silt. Base has very fine-grained brown (7.5YR4/4) sand, saturated.	Borehole advanced 0-14 Ft. with 6.5" o.d. hollow stem auger. Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	0.4	2-12-24 15									
SS	2.0	1.7	15-19 17-18					5			4.3 - 6.5 Ft. Silty SAND and SILT (SM, ML). Dark reddish gray (5YR4/2), fine- and medium-grained.	
SS	2.0	1.7	11-9-13 17								5.3-6.0 Ft. SILT.	
SS	2.0		4-9-14 18								6.0-6.5 Ft. Silty SAND. Greenish gray and yellowish brown, fine-grained.	10.9 Ft. Groundwater observed.
SS	2.0		10-9-18 22					10			6.5 - 10.9 Ft. CLAY (CL). Bottom contact transitional. 6.5-8.1 Ft. Weak red (5R 5/2) and gray. 8.1-10.9 Ft. Yellowish red (5YR4/6) and reddish gray (5YR5/2).	Hole caving in from upper 4-6 Ft.
											10.9 - 14.0 Ft. SAND (SP). Dark grayish brown (10YR4/2), saturated.	
											Bottom of borehole at 14.0 Ft. Borehole backfilled with spoils, 11/6/87.	Augered through the sand to 14.0 Ft. Auger refusal on bedrock.
												Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO.: 1120R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1169R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,455 E 4,276	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-24-87	11-24-87	E.D.I.	Mobile B-57	6.5"	6.5	1.5	8.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
5.7/71		4			/	6.5/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs./ 30 in.	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE "N" BLOWS % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION
SS	2.0	1.2	17-15-7 8								0.0 - 4.3 Ft. Gravelly SILT and Silty GRAVEL FILL (GM-ML).
SS	2.0	1.5	4-2-4-7								0.0-0.7 Ft. Silty GRAVEL, dusky red (7.5R3/2), gravel is broken angular basalt and pieces of wood.
SS	2.0	1.9	7-15 20-20					5			0.7-4.1 Ft. Gravelly SILT, very dark gray (5YR3/1), 2-5 cm. diameter gravel of New Brunswick sandstone, both angular and subrounded; pieces of twigs, bits of glass.
SS	2.0	1.1	20-37 44-23								4.1-4.3 Ft. GRAVEL, light green rock, angular.
											4.3 - 6.5 Ft. Silty SAND (SM). Dark reddish gray (5YR4/2), fine-grained, minor subangular pea gravel.
											6.0-6.5 Ft. Dusky red.
											6.5 - 8.0 Ft. WEATHERED BEDROCK. Dusky red, harder downward, fractured New Brunswick sandstone.
											Bottom of borehole at 8.0 ft. Borehole backfilled with spoils, 11/24/87.

NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.

Borehole advanced 0-8 Ft. with 6.5" o.d. hollow stem auger.

Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.

Hole caved in to 6.5 Ft.

Dry hole.

At 8.0, ENMET reads >300 ppm, with probe at 0.5 Ft.

Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1169R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	2008R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex St. (LODI)	N 2,394 E 4,296	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
10-7-88	10-7-88	EMPIRE SOILS	CME 45B	12"	10.0		10.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
5.6/80		4			▽ 7.0/ 10/7/88	

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
300 lbs./ 24 in.	NONE	J. Lord

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
											0.0 - 1.0 Ft. ASPHALT & GRAVEL. Nat'l Comm. Bank driveway.	Borehole advanced 0-10 Ft. using 6 1/4" i.d. hollow stem augers. Radiologically sampled and gamma-logged by TMA-Eberline, Inc.
SS	1.0	0.8	13-12								1.0 - 4.3 Ft. Gravelly SAND (FILL). Dark grayish red (5YR3/2). Poorly sorted sediments with gravel, cobbles, glass, brick, and a 3" thick plug of wood. Moist to slightly moist, soft.	
SS	2.0	0.8	11-8-5-7									
SS	2.0	2.0	5-4-4-5								3.0-4.0 Ft. No recovery	
								5			4.3 - 5.3 Ft. Silty Gravelly SAND (SG). Dusky brown (5YR2/2). Moist, soft, dense, cohesive. FILL?	Groundwater detected in hole, 7.0 Ft.
SS	2.0	2.0	7-4-6-6								5.3 - 7.7 Ft. Silty SAND (SP). Dusky yellowish brown (10YR2/2), poorly sorted silty sand. 10% coarse fraction. Petroleum odor. Loose, moist to saturated.	
								10			6.0-7.7 Ft. Grading to moderate brown (5YR4/6). Coarsening downwards.	
											7.7 - 10.0 Ft. Silty SAND (SM). Dark yellowish orange (10YR6/6). Well sorted fine-grained sand and silt. Adhesive, saturated, soft. Rapid dilatancy. Undisturbed.	Top of undisturbed soil, 7.7 Ft.
											Bottom of borehole at 10.0 Ft. Borehole backfilled from bottom to 5' with grout, from 5' to 6" with spoils, and patched with asphalt in top 6", 10/7/88.	Elevated scan at 2.0-4.0 interval.
												Description and classification of soils by visual examination of samples.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex St. (LODI)

HOLE NO.: 2008R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1087R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
174 Essex Ave. (LODI)	N 2,104 E 4,300	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-6-87	11-6-87	G. Engel; BNI	Minuteman Auger	4"	4.5		4.5

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
2.7/60		6			▽ /	/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
N/A	NONE	R. Migues

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	1.0	0.6									0.0 - 1.7 Ft. Sandy Silty CLAY (CL-ML). Moderate brown (5YR3/4) mottled with dusky brown (5YR2/2). Fine- to coarse-grained. Humus.	Borehole advanced 0-4.5 Ft. using 3" i.d. split-spoon sampler and 4" o.d. solid stem augers.
SS	1.0	0.4										
SS	0.8	0.6									1.7 - 4.5 Ft. Silty CLAY (CL-ML). Moderate red (5R4/6) with fragments of rock and brick(?).	
SS	0.6	0.4										
SS	0.5	0.6									2.8-3.4 Ft. Brown (10R4/6) and very dusky red (10R2/2).	Borehole was radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	0.6	0.1									3.4-4.5 Ft. Moderate reddish brown (10R4/6).	
											Bottom of borehole at 4.5 Ft. Borehole backfilled with spoils, 11/6/87.	Poor recovery due to auger bit banging on buried debris.
												Augered several holes around 1087R in an attempt to get the probe below 4.5 Ft. None penetrated 5.0 Ft.
												Description and classification of soils by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 174 Essex Ave. (LODI)

HOLE NO.: 1087R

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
FUSRAP	14501-138	1 OF 1	1171R

SITE	COORDINATES	ANGLE FROM HORIZ	BEARING
160 Essex St. (LODI)	N 2,476 E 4,329	Vertical	------

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH
11-25-87	11-25-87	E.D.I.	Mobile B-57	6.5"	5.4	2.6	8.0

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK
4.6/58		4			▽ / ▼ /	5.4/

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140 lbs./ 30 in.	NONE	D. Harnish

SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN g.P.M	WATER PRESSURE TESTS: PRESS. P.S.I.	WATER PRESSURE TESTS: TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	0.8	5-17 13-9								0.0 - 3.8 Ft. Gravelly SAND and SILT FILL (SG, ML).	Borehole advanced 0-8 Ft. with 6.5" o.d. hollow stem auger.
SS	2.0	1.7	2-5-3 10								0.0-2.5 Ft. Gravelly SAND, dark reddish brown (5YR3/4), gravel of New Brunswick sandstone, basalt; silty.	Boring radiologically sampled and gamma-logged by TMA-Eberline, Corp.
SS	2.0	1.6	7-14 17-25					5			2.5-3.8 Ft. SILT, black with some dark brownish gray and greenish gray pieces mixed in, some wood stems.	
SS	2.0	0.5	12-37 55-38								3.0-3.3 Ft. Bedding planes suggested.	
											3.8 - 5.4 Ft. Silty SAND (SM). Dark gray (10YR4/1) becoming dusky red downward, fine-grained.	
											5.4 - 8.0 Ft. WEATHERED BEDROCK. Dusky red, hard, fractured New Brunswick sandstone, becomes harder and less fractured downward.	Photographs of weathered bedrock samples on file.
											Bottom of borehole at 8.0 ft. Borehole backfilled with spoils, 11/25/87.	
												Description and classification of samples by visual examination.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: 160 Essex St. (LODI)

HOLE NO.: 1171R