Formerly Utilized Sites Remedial
Action Program (FUSRAP)

Maywood Chemical Company Superfund Site

ADMINISTRATIVE RECORD

Document Number

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US Army Corps
of Engineers®

PRE-DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, NEW JERSEY

SITE-SPECIFIC ENVIRONMENTAL RESTORATION
CONTRACT NO. DACW41-99-D-9001
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Pre-Design Investigation Work Plan
FUSRAP Maywood Superfund Site
Maywood, Lodi, and Rochelle Park, New Jersey

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LIST OF ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
BNAEs	Base-Neutral Acid Extractables
BNI	Bechtel National, Incorporated
CERCLA	Comprehensive Environmental Response, Compensation and Liabilities Act
CFS	Cubic feet per second
DOE	U.S. Department of Energy
EPP	Environmental Protection Plan
FUSRAP	Formerly Utilized Sites Remedial Action Program
EM	Electromagnetic Method (Geophysical method)
GPM	Gallons per minute
GPR	Ground Penetrating Radar
GWRIWP	Groundwater Remedial Investigation Work Plan
HSA	Hollow Stem Auger
IDW	Investigation Derived Waste
ISOCS	In Situ Object Counting Systems
km	Kilometers
MCW	Maywood Chemical Works
mi	Miles
MISS	Maywood Interim Storage Site
mrem	Milli-rem
MSL	Mean Sea Level
ORNL	Oak Ridge National Laboratory
PCB	Polychlorinated Biphenyl
PCi	picoCurie
PDI	Pre-Design Investigation
PDIWP	Pre-Design Investigation Work Plan
Ra	Radium
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SAIC	Science Applications International Corporation
SOP	Standard Operating Procedure
SOR	Sum-of-Ratios
SVOCs	Semi-Volatile Organic Compounds
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
Th	Thorium
TPH	Total Petroleum Hydrocarbons
U	Uranium
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

1.1 Overview

The FUSRAP Maywood Superfund site (hereafter referred to as the Maywood Site) is located in a highly developed area of northeastern New Jersey, in the boroughs of Maywood and Lodi and the township of Rochelle Park. Radiological and chemical contamination occurred as the result of thorium processing from monazite sand and its use in the manufacture of gas mantles by the Maywood Chemical Works (MCW) from the early 1900s through 1959. The site consists of 88 designated residential, commercial, municipal, and state or federal properties. To date, 64 properties (including all residential and municipal properties) have either been remediated by the U.S. Department of Energy (DOE) or U.S. Army Corps of Engineers (USACE) or are currently being addressed under the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA).

On December 29, 1998, the USACE (New York and Kansas City Districts) issued a Scope of Services (SOS) to address the remaining 24 commercial and governmental properties which potentially contain deposits of radioactive residues and/or hazardous chemicals in surface and subsurface soil associated with operations from the former MCW. The objective of the SOS includes all activities necessary to complete a remedial design (RD) and remedial action (RA) at each remaining property; these have been designated as the Phase II properties.

Each Phase II property has been subject to previous investigations conducted by DOE contractors and/or the New Jersey Department of Environmental Protection (NJDEP). Their investigations have consisted of various amounts and types of data collection activities. The properties are in some cases contiguous; they vary in size and land use development. Radiological conditions vary greatly, both in the estimated volumes requiring remedial action and in the magnitude of the soil concentrations of the radionuclides of concern. This Pre-Design Investigation (PDI) Work Plan has been developed to identify all data gaps and summarize the field activities necessary to acquire the additional information necessary to complete the RD/RA.

1.2 PDI Work Plan Development

The PDI Work Plan has been developed in various stages to expedite the review, comment, and schedule requirements. Initially, existing data were assembled and benchmarked to determine whether radiological data were of a scoping nature or of a level of sufficient detail to establish primary cut lines for excavation. Once the radiological conditions were established, site-specific information was gathered to support design. This information included the status of items such as existing civil/property surveys, foundation building designs, underground utilities, safety issues, and logistical issues. Data gaps were then annotated into broad categories covering radiological, chemical, geotechnical, and design support needs. Properties were grouped into clusters based on geographical location, potential contiguous contamination, and other parameters as explained in Section 4.1. Maps were prepared of each cluster. To fill existing data gaps, specific methods and quantities of pre-design data collection activities were then developed for each cluster.

1.3 Scope of Work

This PDI Work Plan has been developed in accordance with the USACE's (New York and Kansas City Districts) SOS dated December 29, 1998 and entitled "Removal of Radioactively Contaminated Waste, Maywood Superfund site," Maywood, New Jersey. The work has been performed under DACW41-99-D-9001, Unilateral Task Order for the Formerly Utilized Site Remedial Action Program (FUSRAP). Specifically, this PDI Work Plan has been developed as outlined in the attachment to the SOS entitled "Scope: Project Initiation," Item No. 9, Preparation of Pre-Design Investigation Work Plan for Remaining Properties. The purpose of this PDI Work Plan is to address radiological contamination of the Maywood Site soils. In determining the need for existing data, the Work Plan assumes that excavation for the removal of radiological contamination will be conducted on accessible soils. No sampling will be conducted in inaccessible areas, which are defined as soils under permanent structures such as buildings and roadways. In addition, building interiors will not be evaluated for residual radioactivity.

1.4 PDI Work Plan Organization

The PDI Work Plan is organized into eight sections. A brief description of each of the sections of text is provided below.

Section 1.0, **INTRODUCTION**, presents a generalized overview of the PDI project (i.e., overview, work plan development, scope of work, and work plan organization).

Section 2.0, **SITE BACKGROUND AND PHYSICAL SETTING**, uses historical data and information gathered during the evaluation and review phase to provide a general description of the site background and physical setting for the Phase II Commercial and Government vicinity properties (Phase II properties) for the Maywood Site.

Section 3.0, **EVALUATION OF EXISTING DATA**, summarizes the results of findings from the review of available data. This section references the site-specific property evaluations conducted during the review phase, which are included in Appendix A to this work plan.

Section 4.0, **GENERAL APPROACH TO FIELD INVESTIGATIONS,** summarizes the rationale for development of the property clusters and the general approach used to develop the proposed field investigation plan.

Section 5.0, **FIELD INVESTIGATION TASKS,** summarizes the proposed field investigation tasks by individual property cluster. In addition, project planning, support activities, and procedures associated with field tasks are described.

Section 6.0, **PRE-DESIGN INVESTIGATION REPORT**, summarizes the general contents of the PDI Report.

Section 7.0, **PROJECT ORGANIZATION**, summarizes the organization and approach, coordination, and proposed project schedule for the PDI work.

Section 8.0, **REFERENCES,** provides a listing of the references cited in this PDI Work Plan and appendices.

2.0 SITE BACKGROUND AND PHYSICAL SETTING

2.1 Site Location and Description

The Maywood Site is located in Bergen County, New Jersey, approximately 20 km (12 mi) northwest of New York City and 21 km (13 miles) northeast of Newark, New Jersey (Figure 2-1). The Maywood site includes various nearby properties in the boroughs of Maywood and Lodi, and the township of Rochelle Park, New Jersey. These properties were contaminated from processing operations linked to the Maywood Chemical Works (MCW), where thorium, a radioactive element, was extracted from monazite sand. Thorium-232 (^{232}Th) and its decay products were the primary radioactive contaminants associated with this operation. Additional radioactive contaminants of concern include Uranium-238 (^{238}U) and its decay products, including Radium-226 (^{226}Ra).

The Phase II properties were contaminated with radioactive soils from MCW either through the placement of contaminated fill or through transport from overflow of the Lodi Brook. The former channel of the Lodi Brook runs through a majority of the Maywood Site properties (Figure 2-2).

The Maywood site is composed of 88 designated properties: the Stepan property; the Maywood Interim Storage Site (MISS); 59 residential properties; 3 properties owned by the state or federal government; 4 municipal properties; and 20 commercial properties. Of the 88 designated properties, 64 (including all residential and municipal properties) have been remediated by the U.S. Department of Energy (DOE) or the USACE, or are currently being addressed under the interim Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA) cleanup action scheduled for completion in 1999. This PDI Workplan addresses the MISS, Stepan Company, and remaining 22 commercial and governmental properties. Specifically, the properties listed below are included in this workplan:

1 - *8 Mill St.* (NJ Vehicle Inspection Station)
2 - *160 & 174 Essex St.* (National Community Bank)
3 - *80 Industrial Rd.* (formerly Flint Ink; current Jewel Windows)
4 - *80 Hancock St.* (formerly AIRCO Medical; current GGI)
5 - *100 Hancock St.* (formerly Heather Hill; current Appleton Electric)

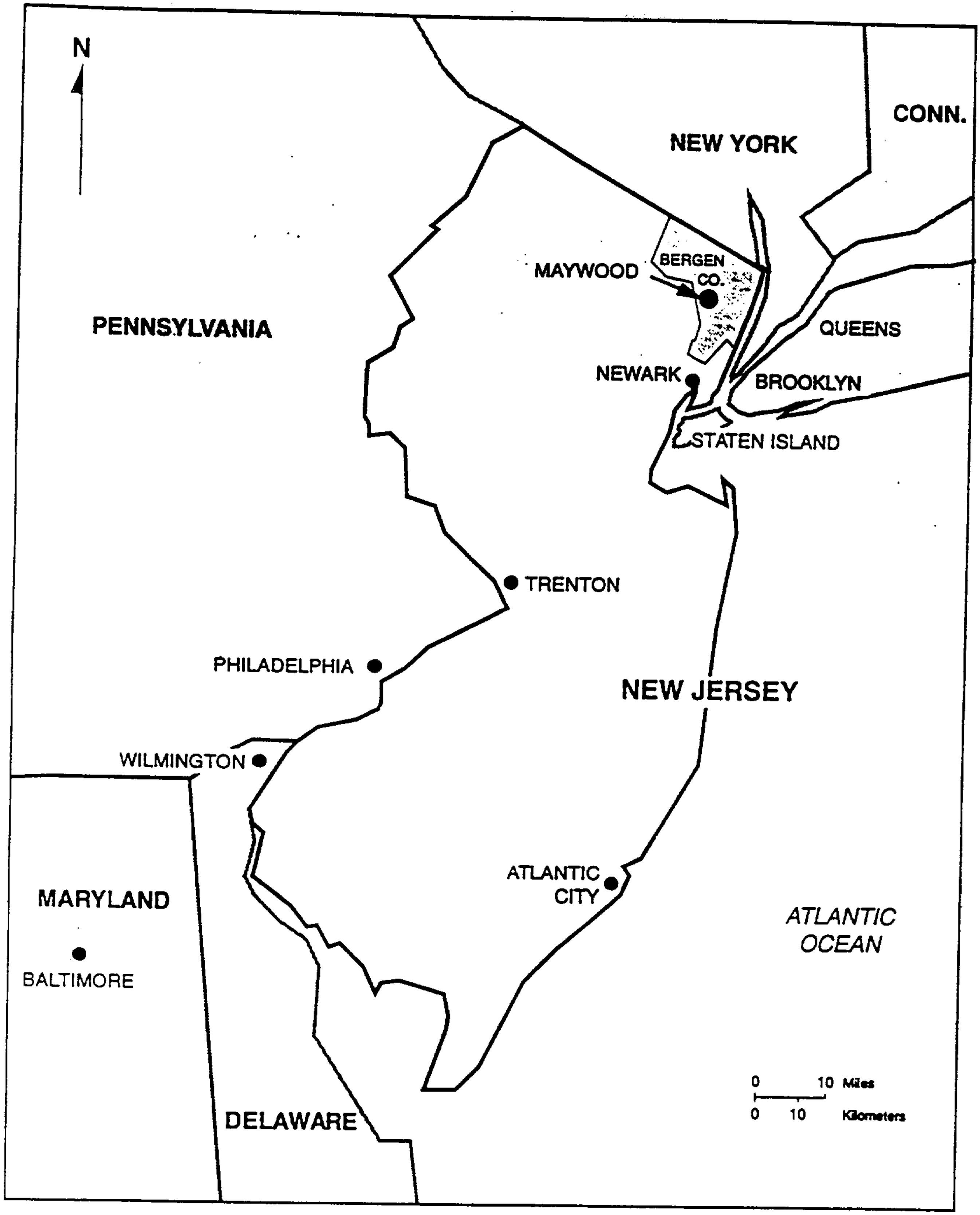


Figure 2-1
Location of Maywood, Bergen County, New Jersey

Source: M-209, Remedial Investigation Report for the Maywood Site, Bechtel National, Inc., December 1992

6 - *149-151 Maywood Ave.* (Sears Distribution Center)
7 - *200 Rt. 17* (Sears Small Truck Repair)
8 - *239 Rt. 17* (Gulf Station)
9 - *113 Essex St.* (formerly National Community Bank; current Bank of New York)
10 - *100 West Hunter* (Stepan Company)
11 - *100 West Hunter* (MISS, Government owned)
12 - *170 Gregg St.* (Bergen Cable)
13 - *23 West Howcroft Road.* (DeSaussure Equip.)
14 - *205 Maywood Ave. / 50 and 61 West Hunter Avenue* (Myron Manufacturing)
15 - *137 Rt. 17* (formerly Federal Express; current Uniform Fashions)
16 - *167 Rt. 17* (Sunoco Station)
17 - *85-101 Rt. 17* (formerly Hunter Douglas and SWS Realty; current Architectural Window Manufacturing Corp, Meta-Life Custom Fabricators, and Computer Service Center)
18 – *99 Essex St.* (Joseph Muscarelle Assoc.)
19 - *New York, Susquehanna & Western Railroad*
20 - *I-80 West* (Right-of-way and underneath roadway)
21 – *72 Sidney St.* (formerly Schenck Chevrolet, also formerly referred to as 88 Money St.; current vacant lot)
22 - *111 Essex St.* (Scanel Property / Hackensack & Lodi Railroad)
23 - *New Jersey Rt. 17* (state property)
24 - *29 Essex St.* (formerly AMF/Voit; current Federal Express)

MISS is an 11.7 acre fenced area, west of and originally part of the Stepan property. MISS includes a warehouse, pump house, temporary office trailers, a reservoir, two rail spurs, and three former retention ponds. The Stepan property, at 100 West Hunter Ave., Maywood, is an 18.2 acre property consisting of 14 industrial buildings. The older buildings were part of the former MCW founded in 1910, which incorporated the Schaefer Alkaloid Works built in 1895. The remaining 22 commercial and governmental vicinity properties that have buildings on them consist of banks, warehouses, gas stations, manufacturing buildings, and office buildings, built between the 1950s and 1980s, along Essex and Hancock streets in Lodi and between Route 17 and Maywood Ave. in Maywood.

The Environmental Protection Plan (EPP, Stone & Webster, 1999) describes the Maywood Site in more detail than is presented here. The reader is directed to the EPP for additional site information.

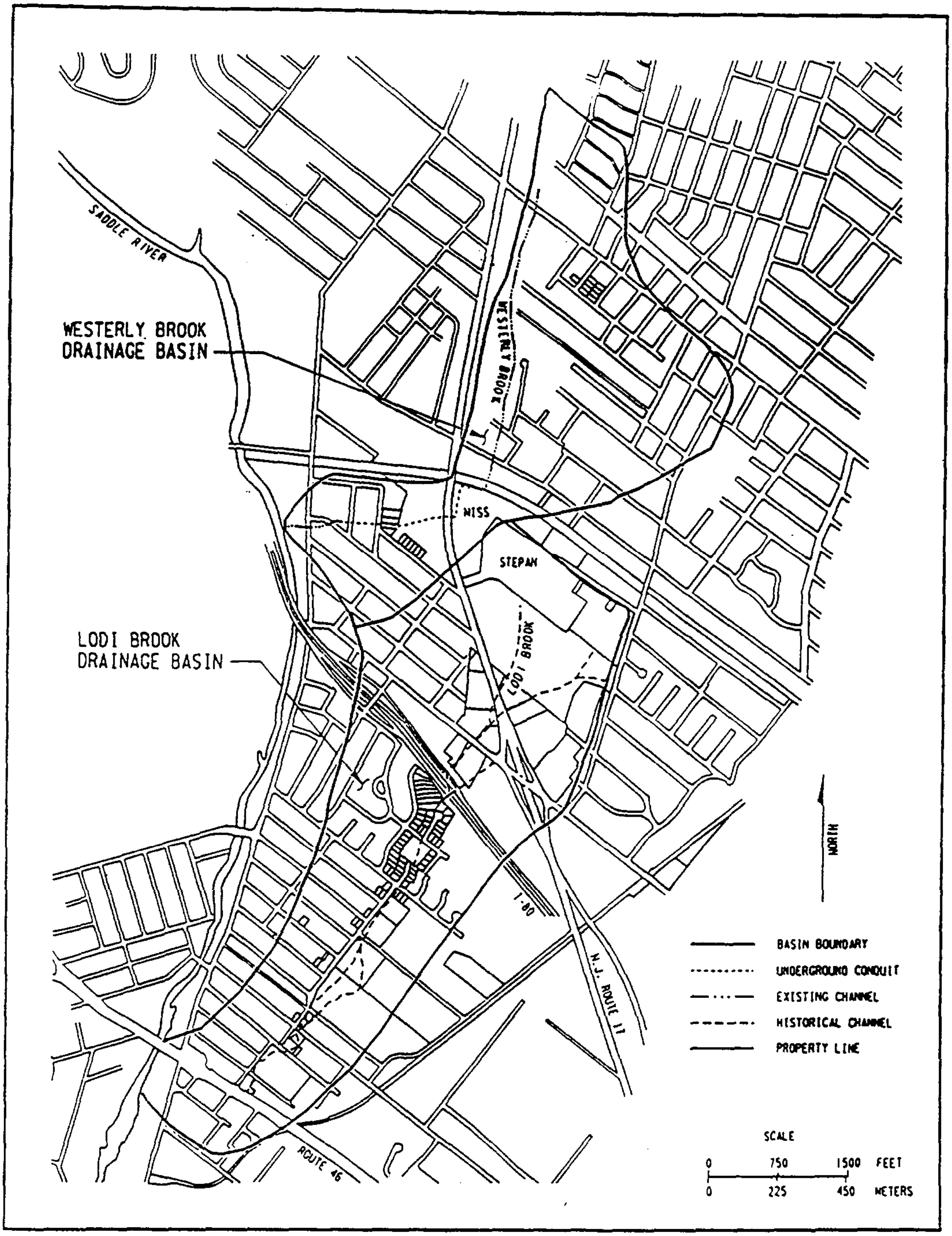


Figure 2-2
Drainage Basins in the Maywood and Lodi Areas

Source: M-209, Remedial Investigation Report for the Maywood Site, Bechtel National, Inc., December 1992

2.2 Historical and Current Land Use

The source of the radiological contamination on the Maywood Site is the former MCW founded in 1910, which incorporated the Schaefer Alkaloid Works constructed in 1895. In 1916, MCW began extracting thorium and rare earth metals from monazite sands for use in manufacturing industrial products such as mantles for gas lanterns. The plant also produced a variety of other materials including lithium compounds, detergents, alkaloids, and oils. MCW discontinued accepting monazite sands in 1956. Stockpiled monazite sands were processed until 1959. Sulfuric acid, nitric acid, ammonium hydroxide, and ammonium oxalate were the chemicals used in the thorium extraction process. Oxalic acid was also used at the site in the production of higher-grade thorium.

A detailed discussion of the site history is provided in the EPP. In addition, a brief description of each of the commercial and governmental properties associated with the Maywood Site is provided in Section 5 and Appendix A of this Work Plan.

2.3 Easements

Table 2-1 summarizes known easements for the Maywood Site properties. This list of easements was compiled from property title deeds. The maps accompanying the title deeds did not depict the locations of the easements. However, some locations have been inferred from drawings obtained from previous investigations and have been added to the figures in this report. This may only be a partial list of easements since not all of the easements were necessarily listed on the title deeds. Also, it must be noted that the 'Source' listed in the table contains the citation for the easement deed, and is different from the title deeds from which the information in the table was culled. A Maywood Site property survey is currently being commissioned. This survey, which encompasses each property, will include a list of easements, location of underground utilities, topographic information, and property metes and bounds. All survey information will be complete prior to conducting any investigations on a given property.

Table 2-1: Easements for the Maywood Site Properties

Property Address	Easement Description	Source for Easement Deed
100 West Hunter Ave. (Stepan Company)		
	Easement to erect and maintain poles	Book 2549, Page 568
	Pipeline easement and right of way to Trans-Continental Gas Pipe Line Corporation	Book 3136, Page 383
	Right of way to State of New Jersey along with slope and drainage easements	Book 1879, Page 130
	Right of way to State of New Jersey along with slope and drainage easements	Book 1831, Page 17
	Drainage easements and rights to the State of New Jersey	Book 1835, Page 28
	Easement to use single track connection extending from railroad spur granted to U.S. DOE	Book 6956, Page 103
149-151 Maywood Ave. (Sears Distribution Center)		
	Sanitary sewer easement 15' wide to the Borough of Maywood	Book 951, Page 116
	Reservation of ditch and drainage easements	Book 1879, Page 126; Book 1831, Page 17; Book 1845, Page 28; Book 1885, Page 438
	Sanitary sewer easement	Book 1885, Page 442
	25-foot wide easement to Transcontinental Pipe Line Company	Book 3136, Page 383
	Rights of others in streams and ditches crossing and bounding the premises	
	Grant to Public Service Electric & Gas Company and New Jersey Bell Telephone Company	Book 4972, Page 249
	Conditions and easements	Book 4835, Page 311
	Grant to Public Service Electric & Gas Company	Book 5453, Page 321
	Widening road and drainage easement	Book 6626, Page 735
	Sanitary sewer easement	Book 6782, Page 283
205 Maywood Ave. (Myron Manufacturing) – no easement records available		
23 West Howcroft Rd. (DeSaussure) – no easement records available		
239 Route 17 (Gulf Station)		
	Right-of-way agreement between Ernest A. Feustel (former owner) and Ironwood Realty Company, Inc.	Book 3270, Page 108
	Slope rights of the State of New Jersey	Book 1798, Page 654
	30-foot wide utilities easement (northeasterly side of property)	Book 3369, Page 6
	Grant of right-of-way to 30-foot wide utilities easement	Book 3393, Page 179
167 Route 17 (Sunoco Station)		
	Slope rights, ditch easements and other rights to the	Book 1807, Page 10

Property Address	Easement Description	Source for Easement Deed
	State of NJ	
	Easement granted to Transcontinental Gas Pipe Line Corporation	Book 3134, Page 414
	Sanitary sewer rights cited in fee title deed	Book 3990, Page 502
I-80 Westbound Right of Way – no easement records available		
NY Susquehanna & Western Railroad – no easement records available		
NJ Route 17 – no easement records available		
100 Hancock St.		
	Grant of rights and easements to erect gas main, pipe, etc.	Book 4301, Page 5
	Utility grants and easements	Book 4286, Page 264
	Two 20-feet wide easements for railroad spurs	Book 4671, Page 19
	Drainage easements cited in fee title deed	Book 6848, Page 196 (Map 5735)
80 Hancock St. – Airco Medical – no easement records available		
170 Gregg St. – Bergen Cable		
	Rights of way	Book 2061, Page 410; Book 2368, Page 623
	Easements	Book 5724, Page 292; Book 6030, Page 66
80 Industrial Road – American Jewel Window Systems		
	20-foot drainage easement and 32-foot easement for railroad siding	Map No. 5735 in Bergen County Clerk's Office
	Utility grants and easements	Book 4286, Page 264;
	Utility grants and easements	Book 4301, Page 5
	Easement and provisions of agreement	Book 4319, Page 488
	Pole and guy anchor easement	Book 4756, Page 484
8 Mill St. (NJ Vehicle Inspection Station) – no easement records available		
72 Sidney St. (88 Money St.) – no easement records available		
111 Essex St. (Scanel)/Hackensack & Lodi RR – no easement records available		
113 Essex St. – (Bank of New York)		
	Sewer easement	Book 4377, Page 11
160/174 Essex. St.		
200 Route 17 (Sears Repair Center)		
	Drainage and sewer easement	Book 3566, Page 11
	Reservation of sewer easement	Book 4495, Page 430
	Storm drain and sewer easement	Book 5021, Page 201
	Subsurface drainage easement	Book 5021, Page 205
	Sewer easement	Book 5021, Page 210
	New Jersey slope and drainage easements	Book 1807, Page 10
	Easement for ingress and egress	Book 6802, Page 201
	Unknown easement	Book 5046, Page 134

Property Address	Easement Description	Source for Easement Deed
99 Essex St. – (Muscarelle)		
	Trunk sewer easement and drainage easement	Book 3566, Page 21
	Right of the State of New Jersey for slope and drainage easements	Book 1807, Page 10
85-101 Route 17 (SWS Realty)		
	Access easement cited in fee title deed	Book 6339, Page 195
	Easement for ingress and egress	Book 4356, Page 528
137 Rt. 17 (AMP Realty Associates)		
	Easement and right of way granted to Transcontinental Gas Pipe Line Corporations	Book 3134, Page 414
	Access and sewer easement	Book 3795, Page 163
29 Essex St. (Federal Express) – no easement records available		
100 West Hunter Ave. (MISS) – no easement records available		

Note: Shaded entries in the 'Source' column indicate that the Team has a copy of the easement deed.

2.4 Site Visit

Stone & Webster Team members (the Team) performed a windshield survey of the Maywood Site on April 16, 1999. This survey was augmented by additional property walkovers, and, in some cases, discussions with property owners or operators. The purpose of the visits was to examine existing field conditions and familiarize pre-design personnel with approximate locations of existing radiological and environmental contamination, logistical, and other concerns. The team members verified existing field conditions with base maps developed from aerial photographs and previous reports.

Observations regarding typical daily operation access requirements, utilities, traffic, and special considerations such as parking requirements and emergency vehicle access were noted. Geographical clustering of individual properties was also formulated based on the site visit. A summary of logistical requirements was developed for each cluster and is described more fully in Section 5.0.

Photographs of several properties are presented in Appendix B.

3.0 EVALUATION OF EXISTING DATA

3.1 Review of Available Data

The Team performed a review and evaluation of existing available data for the Phase II properties outlined in the SOS in preparation of this PDI Work Plan. These documents were primarily furnished by the USACE from the Maywood Information Center, Maywood, New Jersey. The scope of the documents contained information on the Phase II commercial and government vicinity properties logged in the Bechtel, Oak Ridge, and FUSRAP project document control databases. The documents were cross-referenced to the Maywood Site Administrative Record. In addition, electronic files were also furnished to the Team by the Science Applications International Corporation (SAIC) and/or Bechtel National, Incorporated (BNI) and used in preparation of base and contour maps. Information was also acquired from the State of New Jersey Department of Transportation (NJDOT) regarding plans for improving portions of State Route 17, the State Route 17/Essex Street interchange, and the Interstate 80 widening within the State Route 17 vicinity. The findings of the document review for each property are included in Appendix A.

3.2 Topography and Drainage

The Maywood Site is located in northeast New Jersey within the glaciated region of the Piedmont Plateau. The topography is generally flat, with minor relief and slopes gently to the west (Cole et al., 1981). The topography of the Maywood Site ranges from approximately 45 to 75 feet above Mean Sea Level (MSL). Surface runoff primarily flows toward the south via the Passaic/Saddle and Hackensack Rivers.

Two of the largest properties of the Maywood Site include the MISS and Stepan properties which encompass 11.7 and 18.2 acres, respectively. These properties represent the typical topographic, surface, and drainage features observed at many of the PDI commercial properties. For example, the majority of the MISS and Stepan properties are flat with an average slope of 1.2 and 1.8 percent, respectively. The MISS property is covered with grass with the exception of the area around the former interim waste storage pile, the unpaved roads, and the railroad spurs. The Stepan property, like other commercial properties, contains 1 to 2 story buildings which cover approximately two-thirds of the property. The remaining property is paved and contains streets, parking lots, and small isolated grass-landscaped areas. Runoff from the Stepan property drains into either Westerly Brook or Lodi Brook. Approximately one-third of the runoff from the Stepan property enters the MISS property and collects in the northernmost railroad spur. The runoff from the remaining two-thirds of the Stepan property drains toward the southeast into the low marshy area that forms the headwaters of Lodi Brook.

The majority of the remaining 22 commercial properties are also relatively flat and contain multiple story commercial buildings with paved parking lots, grass areas, and suspected wetlands. The properties lie along the former channel of the Lodi Brook. Before urbanization, the area along Lodi Brook consisted of partially wooded fields at the bottom of a shallow valley. The wide, flat valley floor was subject to flooding from precipitation before the brook was re-routed through an underground conduit.

The surface drainage from the Maywood Site primarily enters the Saddle River (via Westerly Brook and Lodi Brook). The Saddle River, with drainage area of approximately 60 square miles, flows south from the headwaters (located approximately 1.5 miles north of the New Jersey State line) for approximately 16 miles before it converges into the Passaic River. Westerly Brook drains an area of approximately 0.4 square miles in Maywood and Rochelle Park. Westerly Brook begins as a natural channel and flows south for approximately 3,200 feet as an open channel before it enters a culvert and flows for approximately 1,920 feet beneath the MISS property. The Westerly Brook then resurfaces and flows approximately 600 feet to its confluence with the Saddle River. Downstream from the MISS property, the flow velocity of the Westerly Brook is low with continuous recharge from groundwater. In the early 1970s, the brook was routed through a culvert for land development purposes. Before that it flowed in an open channel through the MISS property along a similar course as the present underground culvert.

The Lodi Brook drains an area of approximately 0.5 square miles. The Lodi Brook begins on the Sears property in a low marshy area and collects runoff from the Sears and Stepan properties. From there, it flows south under Route 17 through a box culvert, remaining underground for most of its course except for a small section along Route 17 and small sections on both sides of I-80. The Lodi Brook then flows approximately 1.8 miles before joining the Saddle River 1.8 miles downstream of the confluence of Westerly Brook and Saddle River. Lodi Brook is a continuous stream with base flow estimated at 2 cubic feet per second. The southern reach of Lodi Brook was routed through the underground culvert in the late 1940s. The headwaters of Lodi Brook on the Sears property were altered in the late 1960s by the construction of the Sears building.

3.3 Geology

3.3.1 Regional Geology

The Maywood Site lies within the Newark Basin, which extends southwest from the Hudson River Valley to southeast Pennsylvania. Precambrian and early Paleozoic rocks of the southwest New England upland region border the northeast and northwest margins of the Basin. The southeast and southwest portions of the basin overlie and border Paleozoic and Precambrian rocks of the Blue Ridge and Piedmont Provinces (Olsen, 1980). Crystalline rocks of Precambrian age underlie the majority of northern New Jersey and adjacent portions of New York. These rocks are primarily gneisses or granite of metasedimentary origin that have been intruded by igneous magmas. Both the Alleghenian and Taconian orogenies have structurally imprinted the various Precambrian lithologies within the Maywood area. The Precambrian rocks form part of a mountainous northeast-trending belt across northern New Jersey known as the New Jersey Highlands. To the east, these rocks are deeply buried beneath Triassic/Jurassic rocks of the Newark Basin group (sic).

Sedimentation within the Newark Basin occurred along the margin of a plate boundary in a zone of easterly extension. Structurally, the bedrock exhibits a monoclinal dip and contains shallow open folds (Carswell and Rooney, 1976). Stratigraphic data indicate that the basin was strongly asymmetric, taking on the characteristics of enechelon tilted blocks (Manspeizer, 1980). High-angle faults within the Triassic/Jurassic Newark Group sediments step down to the east and are tilted to the south.

North-trending faults in the Triassic/Jurassic formations are bounded on the northwest by the northeast-trending Ramapo Fault. The Ramapo Fault forms the western margin of the Newark Basin and is at its nearest location approximately 13 miles west-northwest of the Maywood Site. The fault has had a long tectonic history, and considerable seismic activity has occurred along its trace in northern New Jersey/eastern New York (Algermissen, 1983; USGS undated). This area appears to be part of a broad, diffuse region of seismic activity that extends north-northeastward from New Jersey to New Brunswick, Canada.

The Newark Basin stratigraphic sequence "Newark Supergroup" is composed of 10 mappable units. The Stockton and the Lockatong are the lowermost formations of Triassic age. The Brunswick Group is the uppermost formation. The lowermost unit of the Brunswick Group underlies the Maywood Site (referred to as the Passaic Formation) and reaches a thickness of approximately 8,000 feet. The Passaic Formation consists primarily of interlayered dark to moderate reddish-brown and fine-grained sandstones. These "Redbeds" are exposed as ridges and hills in the Maywood vicinity; however, most are mantled by unconsolidated Pleistocene and recent deposits.

During the Plesitocene glacial events, the surface topography underwent considerable modifications. The Maywood area was scoured and filled and drainage patterns were altered which created several moraine lakes. Wisconsin-age moraine and stratified and unstratified drift deposits are common in the area. Ridges formed by these deposits have a northeast-southeast lineation, which approximates the direction of ice movement. Drift deposits generally conform to the lithologic character of the underlying redbeds in most localities.

During the late Wisconsin, much of the area extending from south of Newark, New Jersey, northward to Tappan, New York, was covered by preglacial Lake Hackensack. Lake Hackensack basin sediments consist of varved clays and stratified sands up to 100 feet thick (Reeds 1926). During glacial retreat, the melting ice deposited layers of sediments over the irregular bottom of Lake Hackensack (Lovegreen, 1974). These deposits included fine- to medium-grained sand, silt, and clay that were locally reworked by fluvial processes and redeposited on outwash plains. After the morainal dams were breached, the lakebed sediments were exposed to erosion, desiccation, and invasion by vegetation. Lacustrine deposits were limited to smaller isolated basins. The lakebed sediments were covered by peat and dark-colored silty/clayey marsh deposits with a soil horizon, indicating the presence of an open boreal forest (Averill et al., 1980). With the establishment of the modern southward-flowing drainage, the lacustrine and marsh deposits were partially eroded, and Hackensack and Passaic rivers started their depositional history. These rivers deposited thin layers of sediment across much of the floodplain area until human intervention and urban development diverted the courses and changed the flow characteristics of the streams.

3.3.2 Site Geology

The sediments underlying the Maywood Site are composed of two stratigraphic units. The first stratigraphic unit is a bedrock unit composed of interbedded, well-cemented dark reddish-brown sandstone and siltstone of Triassic/Jurassic age (Passaic Formation). The second stratigraphic unit overlies sections of unconsolidated clastic (i.e., fragments of pre-existing rocks) materials of Pliocene-Pleistocene age. These units are separated by an erosional unconformity. The surface of the bedrock unit was extensively eroded by both glacial and fluvial processes, and the unconsolidated sediments overlying the bedrock surface are composed of clastic materials deposited by these processes. The sedimentary section was originally capped with a well-developed deciduous forest soil (Tedrow 1986). The Passaic Formation is exposed as ridges along Interstate 80 and Route 17. The configuration of the bedrock surface developed as the result of erosional processes, which formed elongated northeast- to southwest- trending narrow ridges and broad valleys.

At the MISS property, three identifiable stratigraphic sequences of the Passaic Formation were observed. The uppermost unit is a gray to red weathered silica and calcite cemented quartz sandstone, moderately to highly weathered, with horizontal joints and bedding planes with minor iron and calcite filling. This sandstone unit is widely distributed throughout the local area. Underlying this unit is a finer grained siltstone unit, also gray to red in color but exhibiting more extensive fracturing, jointing and weathering. The lowest unit is composed of coarse-grained sands with minor amounts of conglomeratic materials. This lower unit is also described as gray to red calcite and silica cemented sandstone. Joints and fractures are horizontal, moderately weathered, and coated with crystalline calcite and mud.

The erosional bedrock surface directly influenced the distribution of the overlying unconsolidated sediments and, to a lesser degree, is still expressed in the present surface topography. This surface controlled the courses of streams carrying sediments and thereby affecting the distribution of fine-grained silts and clays (overbank and interfluvial sediments) and coarse sands and gravels (stream deposits).

Extensive agricultural and later urban development disturbed or destroyed much of the original soil profile. Most of the soil cover in the local area is now classified as urban fill (Maywood RI Report, December 1992).

3.4 Hydrogeology

3.4.1 Regional Hydrogeology

Regional groundwater primarily occurs in the interconnected joints and fractures of the weathered bedrock aquifer of the Brunswick Formation (Vecchioli and Miller, 1973). The regional groundwater system consists of a series of alternating tabular aquifers and aquitards several tens of feet thick. The water-bearing fractures of each tabular aquifer are primarily continuous, however, hydraulic connections between each aquifer are poor (Carswell, 1976). The aquifers generally dip downward for a few hundred feet and are continuous along strike (north to northeast) for thousands of feet. In most of the Hackensack River Basin and Bergen County, the Brunswick Formation yields only small to moderate supplies (less than 500 gallons per minute (gpm)) of groundwater to wells (Carswell, 1976). Preferential regional groundwater flow parallels the strike of the beds in the aquifer as determined by various pumping tests in the Maywood area.

The unconsolidated glacial deposits are an alternate source of groundwater for public and industrial use in the area, including parts of Passaic and Morris counties and the area along the Ramapo River in western Bergen County. However, the glacial till has a low permeability and low groundwater yield. The stratified glacial deposits in the area generally have higher permeabilities than the till and frequently yield usable quantities of water. Due to the discontinuous nature of most of the aquifers, there appears to be no well-developed, regional groundwater flow system except for flow through the glacial deposits that underlie many of the rivers in the area.

3.4.2 Site Hydrogeology

At the Maywood Site, the depth to groundwater ranges from approximately 2 to 15 feet below existing ground surface (39 to 54 feet MSL). Results of water level measurements over the past several years have shown that site-specific seasonal fluctuations range from approximately 1.5 feet to 6 feet during a calendar year. Average hydraulic gradients are generally low and groundwater flow is toward the west-southwest toward the Saddle River where groundwater is discharged (Maywood RI Report, December 1992).

At the MISS property, the groundwater occurs in unconsolidated sediments and the shallow Passaic Formation bedrock, and occurs under unconfined and partially confined conditions. Groundwater in the shallow bedrock generally reflects water table conditions toward the northeastern portions of the site and partially confined conditions toward the west and southwest. The variability of fracturing and weathering of the bedrock results in differences in permeability between different zones in the bedrock. The water-bearing fractures at different depths below ground surface contain groundwater under different hydraulic heads. This condition creates potentiometric head differences between the unconsolidated sediments and the bedrock.

3.5 Previous Site-Specific Investigations

3.5.1 Site-Specific/Cluster Distribution of Radiological Contamination

In the late 1980s and early 1990s, site-specific radiological site investigations of Maywood Phase II properties were conducted by BNI under contract to DOE. Some additional investigations were also performed by Oak Ridge Associated Universities (ORAU) for DOE prior to the BNI site characterization activities. Table 3-1 summarizes the depth of radiological contamination detected at the Maywood Site based on these previous investigations.

The results of the site-specific distribution of radiological contamination were evaluated and summarized in Appendix A. Appendix A summarizes existing data and indicates the data needs for the PDI. Radiological data consisted of indoor radon concentrations, walkover exposure rate surveys, surface and subsurface soil sampling, and borehole installation/gross downhole gamma logging. The density of coverage

TABLE 3-1: APPROXIMATE DEPTH OF RADIOLOGICAL CONTAMINATION AT MAYWOOD SITE

Cluster No.	Properties	Max. Depth of Radiological Contamination meters (feet)
1	72 Sidney St. (a.k.a. 88 Money St.)	2 (6)
2	100 Hancock St.	2 (6)
	80 Hancock St.	2 (6)
	80 Industrial Rd.	2.5 (8)
	8 Mill St. (NJ Vehicle Inspection Station)	0.8 (2.5)
3	170 Gregg St. (Bergen Cable)	Only surface contamination found
4	160/174 Essex St. (Bank of New York)	0.9 (3)
	I-80 West Right-of-way	1.5 (5)
5	99 Essex St. (Muscarelle)	0.5 (1.5)
	113 Essex St. (Bank of New York)	0.5 (1.5)
	200 Route 17 South (Sears Small Truck Repair)	1 (3.5)
6	29 Essex St. (Current Fed Ex)	2.5 (8)
	85-101 Route 17 North (Hunter Douglas, SWS Realty)	2.1 (7)
	137 Route 17 North (former Fed Ex, Uniform Fashions)	2.5 (8)
	167 Route 17 North (Sunoco Station)	1.5 (5)
	239 Route 17 North (Gulf Station)	No information available
7	111 Essex Street (Scanel/Hackensack and Lodi Railroad)	2.5 (8.5)
8	23 West Howcroft Rd. (DeSaussure)	3.4 (11)
9	149-151 Maywood Avenue (Sears)	2.5 (8)
10	100 West Hunter Avenue (Stepan Company)	5 (16.5)
11	205 Maywood Avenue (Myron Manufacturing) 50 & 61 West Hunter	0.9 (3)
12	100 West Hunter Avenue (MISS)	6 (20)
	NY, Susquehanna and Western Railroad	No information available
	New Jersey Route 17	6 (20)

Sources:

1. Maywood Data Gap Package, SAIC, 1999
2. BNI Characterization Reports (see references in Section 8)

varied considerably across all properties. Fairly extensive coverage was given to some of the more highly contaminated properties, such as the MISS. Other properties received moderate coverage, while some received little coverage.

3.5.2 Site-Specific/Cluster Distribution of Chemical Contamination

Site-specific data on hazardous chemical parameters collected at the Phase II properties are limited, with the exception of the MISS, Stepan, and Sears properties. The results of the site-specific distribution of chemical contamination were evaluated and summarized on the property evaluation forms for each Phase II property, and are provided in Appendix A.

3.6 Data Gaps

Remedial design of the Phase II properties requires delineation of soil containing radionuclides of concern which exceed the appropriate release criteria, geotechnical and chemical parameter data, and a thorough knowledge of underground and supporting encumbrances which could potentially hinder future construction activities. Data gaps have been qualitatively identified on the property evaluation forms in Appendix A. Evaluation of the data gaps was done as a precursor to establishing the PDI sampling and data collection strategies described for each property cluster in Section 5.4 of this Work Plan. In general, the primary data gaps identified during the review phase and addressed in this PDI Work Plan are as follows:

- Radiological- The amount and quality of data are not sufficient to make a determination of the horizontal and vertical extent of contamination. Surface exposure scans and in-situ surface and subsurface gamma spectroscopy data are needed to define primary cut lines.
- Geotechnical- The amount of existing geotechnical data is insufficient for RD. Laboratory soils data are needed to design sloping and support systems to prevent damage to existing structures adjacent to excavations. Structures requiring protection include roadways, railways, utilities, buildings, etc.

- Underground Utilities- Knowledge about locations of existing underground utilities and geophysical anomalies is limited. All underground utilities and supporting facilities will be identified prior to the implementation of the PDI field work. A property survey is currently being contracted.
- Hydrogeologic Data- Hydrogeologic data are limited at many of the properties. This data gap is referenced in the PDI Work Plan, but data collection activities to fill this data gap will primarily be performed under the Groundwater Remedial Investigation Work Plan (GWRIWP). Nevertheless, water level depths will be recorded when encountered as part of the PDI.
- Chemical Data- Chemical data are of a limited nature for many of the properties. Chemical analysis of soils in radiologically contaminated areas is necessary to determine if mixed waste exists for treatment/disposal purposes. Chemical data will also be used to evaluate health and safety issues.
- Geologic Data- Geologic data obtained from observations of stratigraphy are vital in correlating primary cut lines. Geologic data will be collected during the PDI field activities.
- Historical Use Data- Information on historic use is necessary to determine the potential of non-radiological contamination at the properties.

4.0 GENERAL APPROACH TO FIELD INVESTIGATIONS

4.1 Property/Cluster Rationale

The following defines our approach for designating the 24 Phase II properties into property clusters. Overall selection of the property clusters is focused towards obtaining the greatest efficiency and effectiveness in performing and managing the PDI activities. The resulting 12 property clusters for the FUSRAP Maywood Superfund sites, from south to north, are as follows:

Table 4-1: Properties Comprising Each Cluster

CLUSTER NO.	PROPERTIES
1	72 Sidney St. (a.k.a. 88 Money Street)
2	80 Hancock Street 100 Hancock Street 80 Industrial Road 8 Mill St. (New Jersey Vehicle Inspection Station, NJVIS)
3	170 Gregg Street (Bergen Cable)
4	160/174 Essex Street (Bank of New York) I-80 Westbound Right-of-Way
5	99 Essex Street (Muscarelle) 113 Essex Street (Bank of New York) 200 Route 17 South (Sears Small Truck Repair)
6	29 Essex Street (FedEx) 85-101 Route 17 North (Hunter Douglas, SWS Realty) 137 Route 17 North (AMP Realty) 167 Route 17 North (Sunoco Station) 239 Route 17 North (Gulf Station)
7	111 Essex Street (Scanel/Hackensack and Lodi Railroad)
8	23 West Howcroft Road (DeSaussure)
9	149-151 Maywood Avenue (Sears)
10	100 West Hunter Avenue (Stepan Company)
11	205 Maywood Avenue (Myron Manufacturing)/50 West Hunter Avenue/61 West Hunter Avenue
12	100 West Hunter Avenue (MISS) New York, Susquehanna & Western Railroad New Jersey Route 17

Generally, the following considerations were utilized in developing our approach:

- Clustering aims to take a 'collective' view of a set of contiguous properties to efficiently secure needed PDI information for the cluster of properties. Unique property features will still require added site-specific investigations.
- The contiguous nature of the radiological contamination (i.e., generally MCW as source area and Lodi Brook as transport mechanism and fill material depositional area) lends itself to this clustering approach.
- By establishing these property clusters during the PDI, data and information can be collected, evaluated, and presented in a fashion supportive of and consistent with the anticipated design and remediation of radiologically contaminated soil (i.e., soil excavation).
- PDI activities can be coordinated more efficiently using existing or established common ingress/egress points. This approach will minimize time and costs associated with mobilization and demobilization of survey and field sampling teams, and will minimize impacts to property owners and facility operations at each property.
- PDI activities will be conducted generally from south to north (i.e., from Lodi Borough to Maywood Borough).
- Some properties could not be clustered due to their isolated geographic location (e.g., 72 Sidney Street, 170 Gregg Street, 111 Essex Street, 23 West Howcroft Road) or property size and level of investigation anticipated (e.g., Sears, Stepan).
- Common areas necessary to facilitate PDI activities (i.e., decon/equipment staging areas) can be located within inactive portions of each property cluster. This approach also aids in minimizing disturbance to each property.

4.2 Sequence of Work

The following are the activities that will generally occur at each property (with the exception of 149-151 Maywood Ave., the Sears Distribution Center - see Section 5.4) while performing investigations presented in this Work Plan:

- Obtaining all necessary approvals
- Coordination with property owners
- Topographical, planar & boundary survey/site reconnaissance
- Lay out survey grids
- Wetlands delineation (where appropriate)
- Coordination with activities being conducted by others (e.g., NJDOT)
- Utility markouts
- Geophysical surveys (i.e, electromagnetic (EM), magnetometer, Ground Penetrating Radar (GPR))
- Videotape existing conditions at site
- Layout of PDI sample points on site
- Radiological Investigation
  - Surface exposure rate scan
  - Surface soil measurements
  - Shallow soil gamma logging
  - Push-pipe/downhole measurements
  - Sediment and soil sample collection (as appropriate)
- Geotechnical Investigation (soil and bedrock)
  - Grain size (including hydrometer)
  - Atterberg limits
  - Water content
  - Specific gravity
  - Triaxial tests (cohesive soils)
  - Consolidation tests (cohesive soils)
- Environmental Investigation (soil only)
  - Target Compound List / Target Analyte List (TCL/TAL)
  - Toxicity Characteristic Leaching Procedure (TCLP) and Resource Conservation and Recovery Act (RCRA) characteristics
- End of day/site PDI activities
  - Daily activities
    - Drum Investigation Derived Waste (IDW) and remove from property
    - Decontaminate equipment
    - Store and secure equipment
    - Fill in boreholes
    - General site clean-up
  - Conclusion of PDI
    - Decontaminate
    - General clean-up
    - Restore site as per ROE

All PDI activities will be compliant with procedures established in the following project documents: Health and Safety Plan (HASP), EPP, Chemical Data Quality Management Plan (CDQMP), Contractor Quality Control Plan (CQCP), and Materials Handling, Transportation and Disposal Plan (MHTDP).

The equipment required to complete the PDI will include the use of a mobile rig to install push-pipes, drill rig to install environmental and geotechnical borings, other support vehicles, jack hammers, and miscellaneous manual tools.

4.3 Approach to Radiological Investigation

Radiological measurements will be made at various soil horizons. In general, these soil horizons are defined as follows:

Surface **(0 to 2 feet)** measurements will include the following:

- Surface gamma scan to determine the presence of anomalous gamma count rates within the first two feet from the existing ground surface;

- Surface ISOCS measurements to quantify the radionuclides of concern within the first two feet from the existing ground surface;

- Surface soil samples collected within the first two feet from the existing ground surface.

Shallow **(0 to 5 feet)** measurements will include the following:

- Manually driving a one inch diameter steel rod or a geoprobe to obtain a gamma count rate to a maximum depth of approximately five feet below the ground surface;

- Using a four inch diameter hollow push-pipe to obtain a gamma count rate in the depth range of 0 to 5 feet below the ground surface followed by ISOCS measurements at selected depths to quantify the concentrations of the radionuclides of concern (note: this is the upper portion of the pushpipes that will be installed to greater depths).

Deep **(deeper than 5 feet)** includes the following:

- Using a four inch diameter hollow push-pipe for other sampling means to obtain a gamma count rate at depth below 5-feet below the ground surface, followed by ISOCS measurements at selected depths to quantify the concentrations of the radionuclides of concern.

While the sequence of activities will be the same at all clusters (except Sears Distribution Center), professional judgement will be exercised at appropriate times to modify previously planned data collection activities. Each activity is described below.

At the outset of each property or cluster investigation, surface exposure rate scanning will be conducted in all accessible outdoor areas[1] (except as noted in Section 5) to (1) confirm the presence of radionuclides of concern in surface soil as indicated by previous investigations; (2) bound areas of concern for further investigations, as described below and (3) provide exposure rate data to ensure that occupational exposure is kept as low as reasonably achievable. Measurements will be performed by suspending a 1 inch x 1 inch NaI gamma scintillation detector coupled to a Ludlum Model 12 ratemeter within a few inches of the ground surface. Health physics technicians will walk transects covering the entire property while slowly swinging the detector as described in the CDQMP. Field markings (e.g., pin flags, spray paint, cones, etc.) will be used to identify areas exhibiting surface exposure rates which exceed twice background exposure rates. The data will be located on a property map using a combination of surveying and positioning technology.

As shown in the figures provided in Section 5, shallow (one inch diameter) and deep (approximately four inch diameter) borehole locations have been preliminarily identified at each property. However, results of the surface exposure rate scans may necessitate modification of some of the borehole locations. Boreholes located within suspected areas of radiological contamination will provide information related to the vertical extent of contamination, while boreholes located outside but nearby suspected areas of contamination will help identify the horizontal extent of contamination. Background location boreholes will also be placed at most properties. Surface exposure rate data might reveal the need to place additional boreholes or alter the location of some boreholes to better achieve those objectives.

In situ object counting systems (ISOCS) will be used to perform measurement of the radionuclides of concern in surface soils. ISOCS utilizes germanium gamma spectroscopy to quantify radionuclide concentrations in objects, including soil.

[1] Accessible outdoor areas are those areas on a particular Phase II property that can be readily accessed by the field crew using gamma scan and GPS equipment, including paved surfaces.

Measurements will be performed at all locations identified for collection of geotechnical, environmental, and downhole gamma logging data. Procedures for the operation of the ISOCS equipment are currently under review, and will be provided in the CDQMP and in Appendix D of this workplan.

The PDI provides an opportunity to compare data generated in the field with ISOCS to laboratory data generated in the traditional manner, i.e., via collection and analysis of soil samples. Procedures that enable comparison between the two methodologies are being revised and will be added to the CDQMP and to Appendix D of this workplan. They will be implemented at a variety of locations during the PDI. These data will be supplemented with published studies on the comparability of ISOCS to laboratory data as well as with data generated through participation in appropriate inter-comparison studies.[2]

At some Phase II properties, data generated during previous investigations indicate that radiological contamination is limited to small volumes of soil present mainly in the top two to three feet of soil. Several of these areas will be investigated by manually creating a borehole with a jackhammer and a one-inch diameter steel rod to a depth of approximately five feet. Following extraction of the rod, 30 second gamma counts will be collected at 6-inch increments with a Bicron 3/8" x 3/8" NaI detector coupled to a Ludlum model 2221 ratemeter/scaler. The magnitude of the count rates is proportional to the concentrations of the radionuclides of concern. Note that the concentrations of the radionuclides of concern cannot be quantified directly from the count rate data; however, an estimation can be made (by comparing count rate data to readings collected from background boreholes) as to whether the concentrations in the soil are compliant with the appropriate sum-of-ratios (SOR) release criterion. Downhole gamma logging data will enable an estimate of the vertical and horizontal extent of the radiological contamination within the first five feet of soil. If elevated downhole gamma logging data are recorded, indicating more widespread and deeper radiological contamination, the decision may be made to better quantify the vertical extent of

[2] The comparison described herein is not a direct objective of the PDI and will therefore not be included in the PDI report. The comparison data generated during the investigation as well as the evaluation of appropriate data found in the literature will be reported on in a separate document.

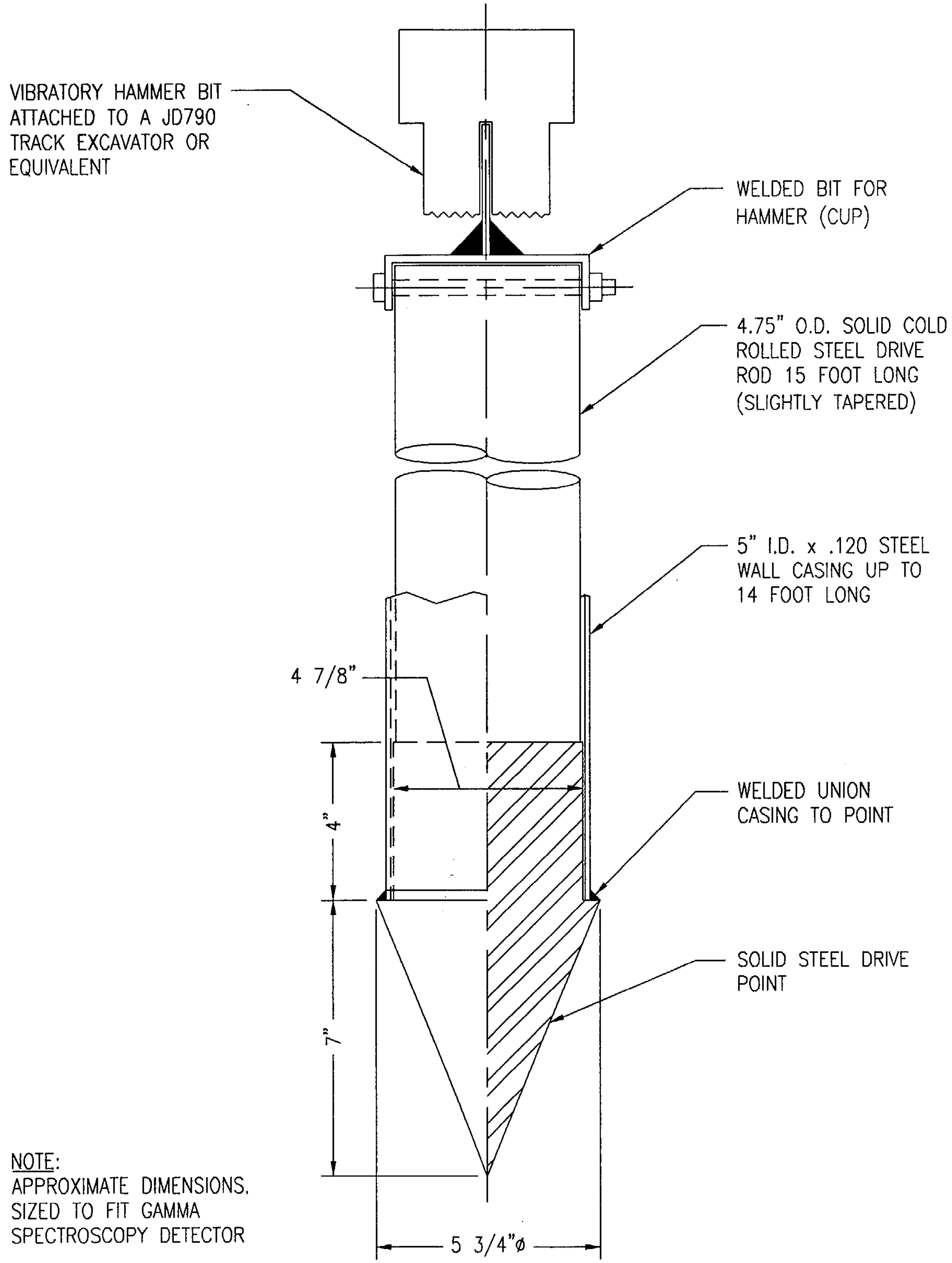
contamination via installation of push-pipes to depths of 12-15 feet, followed by collection of in-situ downhole germanium gamma spectroscopy data.

Germanium gamma spectroscopy data provide a direct measurement of the radionuclides of concern and therefore can be used to directly calculate the SOR at any given location or depth interval. In locations where contamination may approach or exceed depths of approximately five feet, four-inch diameter push-pipes will be driven into the ground. In most cases, push-pipes will be inserted to depths of at least 10 feet, although they may be inserted to as much as 15 feet in some areas (see Figure 4-1). A custom designed ISOCS will be placed inside the hollow push-pipes. Gross gamma logging count rate data will be observed by suspending a sodium iodide detector throughout the push-pipes, enabling the field team to qualitatively determine the depth interval(s) with potential radioactive materials contamination. ISOCS gamma spectroscopy measurements will then be collected at approximately three foot depth intervals, with a focus on the contaminated intervals, such that the data may be used to effectively delineate the soil concentrations for all radionuclides of concern. These activities will provide the additional information needed to complete the remedial design (RD) and remedial actions (RA) at Phase II properties.

Field samples (i.e., sediment, surface water, etc.) will be collected from areas where ISOCS measurements are not possible (e.g., wetlands). They will be sent for laboratory analysis of the radionuclides of concern.

4.4 Approach to Geotechnical Investigations

The need for, and extent of, geotechnical investigations at each site will strictly depend on the results of the radiological investigations and the site conditions. As foundation information for each building (e.g., basement, slab on grade, etc.), or potentially affected structure (e.g., road way, rail spur, pump station, transformer pad, etc.) is made available, and as radiological contamination is identified and depths are determined, it may be found that a given structure's foundation bearing elevation is deeper than the required remediation excavation depth, thus eliminating most geotechnical concerns. Therefore, the geotechnical program will be reevaluated and performed **after** the radiological investigation at each property to enable interpretation of



PROPOSED PUSH-PIPE CASING DRIVE SYSTEM

PROCEDURE FOR INSTALLATION OF PUSH-PIPES FOR DOWN HOLE IN-SITU OBJECT COUNTING SYSTEM MEASUREMENTS

GENERAL

In order to more effectively define the limits of radionuclides in the soil a downhole In Situ Object Counting System (ISOCS) will be utilized. This system will be used in those cases where measurements are desired at depths below the surface of approximately five feet and deeper. To place the ISOCS in the subsurface, it will be necessary to first provide an annulus in the subsurface at the desired locations. The following is the Procedure to be used to develop and place this annulus.

PROCEDURE

As shown, the push pipes will be designed with a solid cold rolled steel rod encased within a thin walled steel casing. The top end of the steel rod will be affixed with a device for attaching it to the driving device and for providing a means to remove it once it has been driven to the desired depth. At the bottom of the thin walled steel casing a solid steel bullet head will be welded to provide ease of insertion and a water tight seal for the thin walled casing.

A JD 790 track excavator (or equivalent) fitted with a hydraulic vibratory hammer attachment will drive the solid cold rolled steel rod. Where vibratory hammer methods could negatively impact proximate structures (buildings, roads, rails), the steel rod will be pushed by the excavator. The rod in turn will push the thin walled steel casing and bullet head. Upon reaching maximum depth or refusal the excavator will be used to remove the rod leaving the casing and bullet head in the ground.

During installation the rod will not only push the thin walled steel casing but also prevent it from bending or decreasing its inside diameter and allowing the ISOCS to be lowered and retrieved without interference or damage. The bullet head has a larger outside diameter than the casing that will limit the resistance (drag) of the soil wall on the casing. The space between the soil and the casing will be approximately the wall thickness of the casing. The welded casing will provide a water tight well.

Retrieval of the thin walled steel casing will be accomplished by attaching a cable or chain between the casing and hydraulic vibratory hammer. All push pipe locations will be grouted with cement-bentonite slurry by tremie method, upon retrieval of the casing.

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT
US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES

Prepared by: MALCOLM PIRNIE	Reviewed by:	Date:
Drawn by: LGM	Date: 6/99	File Name: $MAYF4-1.DWG

PUSH-PIPE INSTALLATION/DOWNHOLE IN SITU OBJECT COUNTING SYSTEM
PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number:
4-1

the results from the radiological investigation **prior** to commencement of the geotechnical investigation.

With an intent to minimize potential impacts to the integrity of existing buildings, roadways, and railways, a preliminary evaluation has been performed to determine the impact on human health risk from leaving subsurface radioactive contaminated soils proximate to these structures in place. The RESRAD computer code was utilized to quantify the dose and carcinogenic risk under a number of assumed conditions.

An infinite horizontal source with a 2 meter thickness of radioactive residues containing 100 pCi/g of ^{232}Th in equilibrium with its decay products and 50 pCi/g of ^{238}U in equilibrium with its decay products was modeled beneath various depths of cover material. A typical resident was assumed to spend 50 and 25 percent of each day indoors and outdoors, respectively. With a 1-meter thick cover of clean soil, the annual dose to the resident was 0.009 mrem, yielding a lifetime cancer risk of 1.6 E-7. A 0.67-meter cover results in a 0.4 mrem annual dose and a 7.5 E-6 lifetime risk. A 0.33-meter cover results in a 22.8 mrem annual dose and a 4.1 E-4 lifetime risk. Note that these are extremely conservative estimates since the model assumes that the layer of subsurface contamination is present throughout the property while the intent is to perform a sloped excavation away from buildings and structures, leaving a width of only a few feet of contamination at some depth below the ground surface. Based on these preliminary results, it has been assumed that there would be placement of a minimum of 0.67-meter, or approximately two feet of clean soil on top of any radioactive residues left adjacent to existing buildings, roadways, and railways. As such, it has been assumed that at least two feet of soil will be removed adjacent to structures to a six foot horizontal setback, and then sloped toward the excavation at a 2H:1V slope to the required depth. Therefore, the geotechnical investigations reflect this consideration in the number and locations of geotechnical borings to be placed at any one property. However, it is recognized that site-specific calculations will need to be made during the subsequent design phase in order to determine the actual depth of excavation adjacent to each structure, the horizontal setback, and the slope to final excavation depths. The intention of the design will be to maximize the amount of contaminated materials that can be removed without compromising the integrity of existing structures and/or facilities (i.e., roadways, railroads and utilities). Site specific considerations could include the presence of groundwater and anomalous soil layers.

Where geotechnical information is required, the PDI program will consist of drilling borings at each site to define subsurface conditions and will include collection of samples for geotechnical laboratory testing. The actual number of geotechnical borings required at each property will be dependent on a number of site-specific factors, namely: the limits (vertical and horizontal) of FUSRAP contamination as determined through radiological testing; the proximity of the FUSRAP contamination with respect to existing structures (including buildings, roadways, and rail-lines); and the quality of existing geotechnical data. Geotechnical borings will be made only should it be determined that design cannot proceed based on known information. When the need for geotechnical borings is identified, all borings will be drilled under the continuous inspection of a geotechnical engineer. The geotechnical engineer will visually classify all soils in the field using the Unified Soil Classification System (ASTM D 2488) and will maintain a continuous written log of the boring progress.

Geotechnical laboratory testing will be performed on soil samples collected from the borings to determine soil parameters for subsequent analysis and design of the soil remediation. Additionally, geotechnical laboratory information may be needed to perform engineering analyses in support of excavation activities. The need for these analyses will be dependent on site conditions, the required limits and depth of excavations, and foundation conditions.

In addition to using the geotechnical data to determine soil stratification and general physical parameter characterization of the soil for design of the remediation, this data will be useful for design of future construction dewatering programs. **After** vertical and horizontal limits of excavation are defined using the PDI radiological data, areas requiring excavation dewatering will be identified. Where applicable, existing groundwater data (i.e., Sears, Stepan, and MISS properties slug tests) will be utilized. Additional information pertaining to excavation dewatering (i.e., slug tests, soil sampling for laboratory permeability and hydraulic conductivity testing, water quality testing, and pump tests) may be required at properties where wells either do not currently exist or where the Groundwater Remedial Investigation Workplan (GWRIWP) does not specifically include groundwater investigation activities.

Where appropriate, geotechnical borings will be drilled using hollow stem auger methods to advance the borings. Cased borings will be used where site-specific conditions (e.g., drilling required below the groundwater table or running sands are encountered) compromise the quality of the data obtained. Soil samples will be collected using a standard two-foot long, two-inch O.D. split spoon sampler. Standard Penetration Test protocol of ASTM D 1586 will be followed for collection of split spoon samples. The depths of borings will depend upon the depth of radiological contamination encountered. Most borings will likely be terminated ten feet below the base of radiological contamination. However, if excavations of significant depth are required adjacent to structures, then borings in this area may be extended deeper to obtain soil stratigraphy information to perform stability and/or bearing capacity analyses.

Continuous sampling will be performed to provide detailed information on the soils to be excavated, to establish soil stratigraphy, and to collect samples for the laboratory testing. If sample recoveries are not sufficient to satisfy the geotechnical engineering needs, the use of three-inch O.D. split spoons at selected sample intervals could be warranted. Where boring depths exceed 20 feet, however, it may not be necessary to sample continuously below that depth. Based upon the soil conditions encountered, a wider sampling interval (not to exceed five feet on center) could be possible below a depth of about 20 feet.

Available subsurface information at some of the sites indicates that bedrock could be encountered in some of the borings. If bedrock is encountered within the proposed boring depth, Standard Practice for Diamond Core Drilling for Site Investigation will be performed in accordance with ASTM D2113. This bedrock information could be required to define soil and bedrock stratigraphy if stability or other foundation support analyses need to be performed for design. Bedrock will be cored in maximum five-foot long runs using an NX-size double-tube core barrel equipped with a split inner barrel and a diamond core bit. Standard classification of rock cores will include percent recovery, RQD discontinuities, degree of weathering, structure, mineralogy, joint orientation, etc.

Where fine-grained soils (e.g., silt, clay, peat) are encountered, undisturbed tube samples will be collected at locations and depths determined in the field for laboratory determination of strength and consolidation parameters (if necessary), near locations where excavations will be adjacent to structures or buildings and where construction dewatering will be required. These samples will be collected using appropriate undisturbed sampling equipment for the strata encountered.

Anticipated geotechnical laboratory tests include determinations of grain-size distribution (using both sieve and hydrometer analyses), water content, specific gravity, and Atterberg limits. If different soil types are encountered in a boring, (e.g., cohesionless and cohesive soils) tests will be performed on each soil type.

Additionally, if fine-grained cohesive soils are encountered, laboratory tests such as unconsolidated undrained (UU) triaxial compression and consolidation testing of undisturbed tube samples could be required to determine parameters for geotechnical analyses, such as slope stability, bearing capacity, foundation support, and settlement of foundations due to site dewatering and excavation work.

Upon completion of each boring, the borehole will be sealed in accordance with Standard Operating Procedure (SOP) number SW-MWD-308-0 for Soil Borings and Sampling (see Appendix D and CDQMP).

4.5 Approach to Environmental Investigations

The Government's responsibility for remediating chemical (or non-radiological) contamination on Phase II properties has been determined as follows:

- The non-radiological contamination must be mixed or commingled with the existing radiological contamination that exceeds DOE action levels; or
- The non-radiological contamination must have originated at the Maywood Site or it must be associated with specific thorium manufacturing or processing activities from the Maywood Site that resulted in the radiological contamination.

Based on previous studies, the chemicals listed in the following table are associated with the manufacturing or processing activities that resulted in the radiological contamination at the Maywood Site.

Table 4-2: Chemicals/Elements Associated with Thorium Manufacturing and Processing Activities at MCW

CHEMICALS/ELEMENTS	SOURCE
Aluminum	Monazite Sands
Calcium	Monazite Sands
Cerium (rare earth)	Monazite Sands
Ferric Iron	Monazite Sands
Lanthanum (rare earth)	Monazite Sands
Magnesium	Monazite Sands
Neodymium (rare earth)	Monazite Sands
Silicon	Monazite Sands
Thorium	Monazite Sands
Titanium	Monazite Sands
Uranium	Monazite Sands
Yttrium	Monazite Sands
Zirconium	Monazite Sands
Sulfuric Acid	Thorium Processing
Soda Ash	Thorium Processing
Ammonia	Thorium Processing
Hydrogen Sulfite	Thorium Processing
Hydrogen Sulfide	Thorium Processing
Oxalic Acid	Thorium Processing
Hydrogen Chloride	Thorium Processing
Nitric Acid	Thorium Processing
Caustic Soda	Thorium Processing

The majority of the rare earth elements, as well as the metals, are expected to be associated with the radiological contamination, and thus will be removed in conjunction with the removal of the radiologically contaminated soil. Sulfuric acid, hydrogen chloride, hydrogen sulfide, ammonia, and nitric acid are considered hazardous wastes under CERCLA. However, these compounds would no longer be present in the environment because of the breakdown of these compounds due to the physical, chemical, and microbial reactions between the compounds, soil and pore water. For example, these compounds can hydrolyze, oxidize, or reduce very quickly upon contact with soil and pore water. In addition, pore water will transport and dilute concentrations of these compounds.

Previous environmental investigations at Phase II properties (especially the Borough of Maywood properties) indicated that inorganics such as arsenic, cadmium, chromium, lead, antimony, beryllium, and lithium were detected in concentrations exceeding New Jersey DEP soil cleanup criteria. Historical information indicates that these metals were not used in the thorium processing operations; these metals, if present, may therefore be a by-product of industrial and commercial processes within the Maywood Site area.

Organic compounds occurred infrequently at trace or non-detect concentrations at most Phase II properties (see Section 5.4 for detailed site environmental information). Historical information indicates that no organic constituents were used in the thorium processing operations. Any organic compounds may therefore be more characteristic of industrialized and commercial uses within the areas.

Based on this overall evaluation of Phase II properties and the overall objectives of the PDI and RD/RA, the PDI program for chemical contamination was developed to attain the following objectives:

- Identify chemical contamination **associated with** the radioactive waste to aid in determining waste classification (i.e., whether hazardous waste, as defined by RCRA, is commingled with radioactive waste)
- Provide data for worker health and safety.

To satisfy these criteria, the PDI environmental program is designed to collect samples **only in areas of identified radiological contamination** to aid in determination of disposal requirements. The disposal facility has not yet been selected. Note that the selected disposal facility may require additional chemical analyses. Soil samples will be analyzed for RCRA disposal characteristics (ignitability, reactivity, corrosivity, and TCLP) and TCL/TAL with chromium speciation. Chromium speciation is being performed to provide additional worker safety data. Specifics regarding the sampling program are discussed in the individual cluster write-ups in Section 5.

Soil borings for chemical analysis will be collected with the use of a vehicle-mounted direct push rig equipped with a 3-inch diameter, 2-foot long soil sampler. Split-spoon samples will be collected continuously (at two-foot intervals) in advance of the probe rods from the existing ground surface to the bottom of each boring. The borehole will be conducted to the maximum depth of radiological contamination. Soils exhibiting the highest PID readings or visual contamination will be sent for laboratory analyses.

All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or geotechnical engineer. In addition to sample description, the sample color, depositional type, PID and Geiger Mueller (GM) pancake detector readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on boring logs and in field log books.

4.6 Related PDI Activities

In addition to the radiological, geotechnical, and environmental sampling programs described above, other field activities will be performed to collect data essential for remedial design. These activities include topographical, planar & boundary surveys, geophysical surveys, underground and overhead utility searches, and wetland delineations.

4.6.1 Approach to Civil Surveys

Reports prepared by others that have been reviewed as part of this PDI Work Plan development contain numerous maps prepared for the various Maywood properties. However, the detail of the drawings varies from site to site, and the drawings are largely inadequate for design purposes. Designation of coordinates for limits of excavation, identification of structures and transportation features (roads and railways) that are to be protected adjacent to excavations, and general site layout cannot be done based on currently available site drawings.

As a first step in the PDI program, a site survey is being commissioned to develop detailed mapping of the Maywood Site properties. This mapping will include location of prominent structures, roadways, sidewalks, asphalt areas, vegetated areas, fences, recorded below-ground utilities, and aboveground utilities. All drawings will be signed and sealed by the licensed surveyor. In addition, specific contact will be made with the NJDOT, since they have already been helpful in providing the Team with some very specific civil drawings for portions of the Maywood Site.

4.6.2 Approach to Geophysical Surveys and Underground Utility Searches

Records reviewed to date indicate that underground structures and utilities are present throughout the Maywood properties. Unfortunately, existing mapping does not generally indicate the location of these items. Because of the health and safety risks and potential liabilities associated with performing intrusive activities near underground utilities, the location of all underground utilities and structures must be known prior to commencing with the intrusive portions of this work.

Interviews will continue to be held with property owners and tenants in an effort to identify known underground features. Individual utility companies and the New Jersey Call-Before-You-Dig program will be contacted to provide utility mark-outs. Locations of known or suspected underground features will be identified by performing appropriate geophysical surveys. These surveys could include terrain conductivity (using EM-31 or similar equipment), magnetometer, or GPR. The appropriate surveys will be performed based upon actual site conditions.

4.6.3 Approach to Wetland Delineations

Wetlands have been identified at a number of the Maywood properties to be studied under this PDI. Previous investigations performed by others indicate varying degrees of wetland delineation activities have been performed at several of the properties. However, details of how these delineations were performed are not available, and it is questionable whether appropriate USACE and NJDEP protocols were followed.

At each property that has been identified in previous reports as exhibiting wetland characteristics at or nearby the property, and at each property that has been visually identified by the Team as exhibiting wetland characteristics, a complete wetland delineation will be performed. Team scientists will define the limits of on-site jurisdictional wetlands as determined by application of the Federal Manual for

Identifying and Delineating Jurisdictional Wetlands, Federal Interagency Committee for Wetland Delineation, 1989. The NJDEP has assumed the jurisdictional determination process for freshwater wetlands from the USACE under Section 404 of the Clean Water Act and enforces this 1989 federal delineation manual. The wetlands limits will be mapped by a licensed surveyor.

5.0 FIELD INVESTIGATION TASKS

5.1 Project Planning

This task involves several subtasks that must be performed prior to execution of the PDI work and corresponding schedule. These subtasks include coordination with regulatory agencies (USEPA, NJ State, and local agencies), property access and ROE, and coordination/scheduling with current property owners.

5.1.1 Coordination with USEPA, NJDOT, State, and Local Agencies

The Team will initiate a coordinated approach prior to the start of PDI fieldwork to ensure that planned work meets with all relevant permit/regulatory requirements. The Team will hold coordination meetings prior to the start of PDI work and during specific milestones within the project schedule. Meetings will be scheduled so that the Team and regulatory representatives (USEPA, NJDOT, and local agencies) have the opportunity to participate in discussions regarding planned work and mitigate any potential impacts or conflicts with regulatory requirements.

5.1.2 Property Access and Right-of-Entry (ROE)

Property access and ROE is a critical subtask in project planning and community relations. Property access and ROEs will be obtained via written agreement prior to the start of PDI field work, and any and all specific requirements of the ROE will be adhered to in the PDI. The USACE has initiated ROE negotiations with the existing site owners, and the Team will continue to support the USACE in finalizing ROEs for PDI field work.

5.1.3 Coordination/Scheduling with Property Owners

Coordination and scheduling/sequencing of work with existing property owners will be conducted prior to the start of all PDI field work. The Team will continue to give sufficient advanced notice to property owners/tenants of planned work and schedule PDI field work so that potential impacts to existing occupants is minimized. The Team will continue to work with the property owners and/or tenants to enable continuation of normal business during the PDI to the fullest extent possible. Driveways and entrances will be maintained and available to property owners, employees, and emergency vehicles at all times. Parking areas will not be used for delivery or storage of materials. The Team shall have sufficient flagmen, barricades, lights, signs, and all other precautions necessary to provide safe work conditions. The Team shall interface with existing owners, local police and fire departments to establish necessary security requirements and make special security provisions, as appropriate.

5.2 Support Activities

Several subtasks must be performed prior to implementation of the PDI. The support activities are integral to successful PDI implementation. They include mobilization and demobilization, property surveys, utility mark-outs and clearance, wetland delineation, site clearing in areas where there is excess vegetation, and procurement of subcontractor services.

5.2.1 Mobilization and Demobilization

This subtask includes all work required to mobilize and demobilize labor, equipment, and materials to perform the PDI. In addition, this task includes all miscellaneous activities associated with mobilization and demobilization prior to PDI field work, including field personnel orientation, equipment mobilization and demobilization, staking and mark-out of proposed push-pipe, soil boring, and test pit locations, construction of decontamination and daytime IDW staging areas, attendance of on-site orientation meetings, and construction of temporary support trailers and utility hook-ups.

Under this task, equipment will be ordered, purchased, and fabricated. A complete inventory of equipment required for the PDI will be prepared prior to initiating field activities. Equipment will be decontaminated and demobilized at the completion of each phase of field activities, or after each cluster/property investigation has been completed. Decontamination of equipment will be performed at an area designated at each property cluster following installation of each borehole to prevent cross-contamination.

Each field team member will attend property orientation meetings to become familiar with the history of the Maywood Site and each property, health and safety requirements, and field procedures prior to performing work.

Locations of push-pipes, gamma logging holes, soil borings, and test pits will be field checked and staked at the start of the PDI investigation. The locations will be measured from existing landmarks using prepared property survey drawings. A utility check and stakeout will be conducted at each property.

Decontamination solutions, drill cuttings, and other IDW will be stored in DOT-approved 55-gallon drums at an IDW staging area on-site during the day. **At the end of each day, all IDW will leave the property and be moved to MISS to a designated IDW laydown area. No IDW is to be stored overnight at any of the properties.** Any deviation from this policy will be discussed with the property owner and the USACE prior to implementation. The drums will be permanently numbered and an inventory of their contents maintained. The final disposal of drummed drill cuttings, other IDW, and health and safety related equipment such as PPE will be coordinated with the USACE.

5.2.2 Property Surveys

Property surveys including boundary, planimetric and topographic surveys will be performed for all properties within each of the property clusters to show the location and elevation of surface and property features necessary to perform the PDI. This will include all aboveground encumbrances (e.g., overhead electric, etc.). Topographic maps will be drawn to a scale of one inch equals thirty feet with one foot contours by photogrammetric methods on a First Order Kern DSR-11 Automated Plotting System. All maps will be prepared so that horizontal control will be tied to the NJ State Plane Coordinate System (NAD 1927) with gridlines shown at 250 foot intervals. Permanent survey monuments for horizontal and vertical control will be established at each property cluster.

Survey of push-pipe, gamma logging holes, soil boring, and test pit locations will be performed immediately following completion of PDI field activities. Push-pipe and geotechnical/environmental soil boring locations will be grouted following completion of each borehole and subsequently staked, flagged, marked and labeled. Borehole locations will be surveyed; locations and elevations will be incorporated into existing basemaps of each cluster/property. Survey work will be performed by a New Jersey licensed professional surveyor.

5.2.3 Utility Mark-Outs and Clearance

Prior to initiation of PDI field activities, the location of existing utilities must be established in the areas identified for PDI field work. This subtask will be accomplished using a combination of methods including coordination with local utilities and building owners and performance of supplemental geophysical surveys.

Utility Mark-Outs

All utility companies in the project area will be notified of the PDI work in advance of field activities in accordance with New Jersey State requirements. Utility companies including gas, electric, water, sewer, telephone, and cable will be required to mark-out their transmission and distribution systems outside property lines including main lines and service connections according to New Jersey State color coding universal color-coding systems. The Team will coordinate all utility company activity to assure that no conflicts arise with existing commercial operations at any of the study area properties. If conflicts with proposed PDI measurement locations are apparent, boreholes will be offset from existing utilities as appropriate.

Coordination with Building Owners

The Team will coordinate with existing owners and acquire as-built utility drawings of each property and associated building structures, including aboveground/underground storage tanks and transformer pads, to determine locations of existing utilities within the property boundaries. The Team will perform a site walk through at each property cluster and coordinate access to interior of building structures to determine utility entrance and exit locations. In addition, fill or vent pipes will be noted and marked during the site survey, as will the presence of existing equipment which will need to be moved prior to performance of PDI field work. Movement of equipment will be coordinated with property owners.

Supplemental Geophysical Surveys

The Team will perform supplemental geophysical services to provide information on potential underground storage tanks and buried metallic objects and pipelines within the PDI areas. These surveys will be performed in (1) known areas of radiological contamination; (2) known or suspected locations of underground utilities; and (3) other areas which may be impacted by the movement of heavy vehicles as a result of remedial activities. Geophysical surveys will consist primarily of a combination of methods to provide the most accurate depiction of underground facilities. Because many of the property clusters are in high interference (i.e., steel buildings, overhead electric lines, and railroad tracks) areas and are paved or developed, surface features may interfere with one or more of the geophysical methods and therefore a combination of methods may be required.

Three geophysical surveys will be conducted at the onset of the PDI to detect any subsurface anomalies. Geophysical surveys will consist of electromagnetic surveys (EM), magnetometer surveys, and ground penetrating radar (GPR). EM surveys will be conducted using a Geonics Limited EM-61 (or equivalent instrumentation) to detect metallic subsurface features and non-metallic subsurface features (such as concrete). They will also be used as a check on the magnetometer survey.

Magnetometer surveys will be conducted in open areas. Magnetometer surveys will be conducted using a backpack mounted EG &G GeoMetrics Model G-856 Proton Precision Magnetometer (or equivalent instrumentation). They are extremely sensitive to metallic surface features such as fences.

GPR will be conducted to supplement the EM and magnetometer surveys. Subsurface features, such as utility trenches, will be investigated using GPR which can locate non-metallic items and changes in stratigraphy.

All geophysical surveys will be conducted along pre-established grid lines located by surveyors in the areas identified above, appropriate to each property cluster.

5.2.4 Site Clearing

Site clearing activities will be performed to allow access to sampling locations by truck-mounted and all-terrain vehicles (ATV) mounted drill rigs and support vehicles. Site clearing activities will include clearing of small-diameter trees, reeds, and brush necessary to create vehicle access roads and paths around proposed locations of decontamination pads, push-pipe, soil boring, and test pit locations. Selective clearing may also be necessary during the PDI to support changes in proposed sampling locations that may be necessary if field conditions change during the course of work.

Site clearing will be performed primarily with the use of hand-held power-assisted equipment such as small chain saws. Front-end loaders and/or backhoes will be used in areas to expedite the clearing of dense brush. The removal of trees will be avoided. All work will be performed in accordance with the HASP. Hand-held power equipment will be used to obtain the necessary overhead clearance for drill rigs, if necessary. Overhead electric and telephone power lines will be located prior to performing any clearing activities.

5.2.5 Procurement of Subcontractor Services

To support the PDI, the following subcontracts will be procured by the Team:

1. A drilling subcontract for soil borings, test pits, construction of decontamination pads, site clearing, removal of IDW, and restoration of boring location areas.
2. A subcontract for installation of push-pipes and equipment for measurements using germanium gamma spectroscopy.
3. A surveying subcontract for civil surveys including property surveys, boundary surveys, topographic surveys, geophysical gridline layout, and the surveying of horizontal and vertical locations of as-built boreholes.
4. A geophysical subcontract for utility and other underground obstruction clearances.
5. Laboratory subcontracts for radiological, chemical, and geotechnical analysis.
6. Subcontracts or purchase order agreements for other services such as field office trailers, utility services, specialty instruments, as required.

5.3 Procedures

Numerous procedures will be implemented as part of PDI field activities. Detailed descriptions of the procedures are provided in the Chemical Data Quality Management Plan (CDQMP). The following procedures are included as Appendix D to this document and are to be used in support of this PDI Work Plan

:

SW-MWD-102-0	Downhole Gamma Radiation Logging
SW-MWD-103-0	Routine Operations Procedure for ISOCS Measurements of Surface Soil
SW-MWD-104-0	Routine Operations Procedure for ISOCS Measurements of Subsurface Soil
SW-MWD-106-0	ISOCS Management Procedure
SW-MWD-107-0	Radiation Exposure Surveys and Scans
SW-MWD-108-0	Global Positioning System (GPS) Survey
SW-MWD-109-0	Procedure for Comparative ISOCS and Soil Sample Measurements
SW-MWD-203-0	Rock Coring
SW-MWD-301-0	Sediment Sampling
SW-MWD-302-0	Surface Water Sampling
SW-MWD-307-0	Surface and Shallow Subsurface Soil Sampling
SW-MWD-308-0	Soil Borings and Sampling
SW-MWD-313-0	Drum Handling and Sampling
SW-MWD-501-0	Conducting Field Audits
SW-MWD-503-0	Overburden Drilling Methods
SW-MWD-504-0	Labeling, Packaging, and Shipping Environmental Samples
SW-MWD-505-0	Cuttings and Fluids Management
SW-MWD-506-0	Decontamination
SW-MWD-507-0	Field Notebook Content and Control
SW-MWD-508-0	Procedure for Shipping Radiologically Contaminated Environmental Samples

Requirements for the Preparation of Sampling and Analysis Plans

Selected Tables from the QAPP and the FSP

5.4 Property Cluster-Specific Investigations

The following sections provide details of the proposed property cluster-specific investigations. Table 5-1 on the following page is a summary of the proposed sampling and analysis for all of the property clusters. Table 5-2 is a list of TCL/TAL analytes.

TABLE 5-1: SUMMARY OF PDI SOIL SAMPLES AND ANALYSES

PROPERTY CLUSTER NUMBER (8)	NUMBER OF SAMPLING LOCATIONS					NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (6)								
	RADIOLOGICAL SURVEY			GEOTECHNICAL	ENVIRONMENTAL	GEOTECHNICAL						CHEMICAL ANALYSES		
	GAMMA LOGGING 1" DIAMETER (1)	*PUSH PIPES 4" DIAMETER (2)*	*SOIL SAMPLES FOR RADIOLOGICAL ANALYSES (3)*	*SOIL BORINGS (4)*	*SOIL BORINGS (4,5)*	*SPECIFIC GRAVITY*	*ATTERBERG LIMITS*	*GRAIN SIZE*	*TRIAXIAL TESTS (7)*	*CONSOLID. TESTS (7)*	*WATER CONTENT*	*CHROMIUM SPECIATION*	*TCL/TAL*	*FULL RCRA CHAR.*
1	13	0	1	3	1	TBD	TBD	TBD	TBD	TBD	TBD	1	1	1
2	10	86	10	22	8	TBD	TBD	TBD	TBD	TBD	TBD	8	8	8
3	10	0	1	2	1	TBD	TBD	TBD	TBD	TBD	TBD	1	1	1
4	3	29	3	4	3	TBD	TBD	TBD	TBD	TBD	TBD	3	3	3
5	29	50	8	8	3	TBD	TBD	TBD	TBD	TBD	TBD	3	3	3
6	13	72	8	12	5	TBD	TBD	TBD	TBD	TBD	TBD	5	5	5
7	0	28	3	4	2	TBD	TBD	TBD	TBD	TBD	TBD	2	2	2
8	0	26	3	6	3	TBD	TBD	TBD	TBD	TBD	TBD	3	3	3
9	0	131	13	17	5	TBD	TBD	TBD	TBD	TBD	TBD	5	5	5
10	27	79	11	16	6	TBD	TBD	TBD	TBD	TBD	TBD	6	6	6
11	16	0	2	4	2	TBD	TBD	TBD	TBD	TBD	TBD	2	2	2
12	16	135	15	17	8	TBD	TBD	TBD	TBD	TBD	TBD	8	8	8
TOTALS	**137**	**636**	**78**	**115**	**47**	---	---	---	---	---	---	**47**	**47**	**47**

TABLE 5-1: SUMMARY OF PDI SOIL SAMPLES AND ANALYSES

NOTES:
(1) Shallow sample depths, generally 1-5 feet.
(2) Most push pipes installed to maximum depths of 10 feet. Will be installed to deeper depths if required.
(3) Surface soil samples will be randomly collected from up to 10% of the gamma logging and push pipe locations for radiological analyses. Sample locations will be determine
(4) Depths and quantities to be determined in field based on radiological data, structure foundations depths, etc.
(5) Advanced to depth of radiological contamination.
(6) Sample Analyses Rationale:
(a) Chromium Speciation - Speciation of trivalent and hexavalent chromium for health and safety purposes.
(b) TCL/TAL - Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
(c) RCRA Characteristics - To support transportation & disposal activities
(d) Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, Water Content) -
To characterize physical properties of soil for excavation and remediation.
(7) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine-grained mat
These parameters will be used to perform bearing capacity and settlement analyses where excavations are adjacent to structures.
(8) Property Clusters are defined as follows:

PROPERTY CLUSTER NO. 1:72 SIDNEY ST. (A.K.A 88 MONEY ST.)
PROPERTY CLUSTER NO. 2: 100, 80 HANCOCK ST., 80 INDUSTRIAL RD., AND NJVIS
PROPERTY CLUSTER NO. 3: 170 GREGG ST.
PROPERTY CLUSTER NO. 4: 160/174 ESSEX ST., I-80 RIGHT-OF-WAY
PROPERTY CLUSTER NO. 5: 99 ESSEX ST, 113 ESSEX ST., 200 ROUTE 17 SOUTH
PROPERTY CLUSTER NO. 6: 29 ESSEX ST., 85-101 ROUTE 17 NORTH, 137 ROUTE 17 NORTH, 167 ROUTE 17 NORTH, 239 ROUTE 17 NORTH
PROPERTY CLUSTER NO. 7: 111 ESSEX ST.- SCANEL/HACKENSACK AND LODI RAILROAD
PROPERTY CLUSTER NO. 8: 23 WEST HOWCROFT RD.
PROPERTY CLUSTER NO.9: 149-151 MAYWOOD AVE.
PROPERTY CLUSTER NO.10: 100 W. HUNTER AVE.
PROPERTY CLUSTER NO.11: 205 MAYWOOD AVENUE AND 50 & 61 WEST HUNTER AVE.
PROPERTY CLUSTER NO.12: 100 W. HUNTER AVE., NY, SUSQUEHANNA AND WESTERN RAILROAD, AND NJ ROUTE 17

Table 5-2
TCL/TAL Analyte List

Target Compound List (TCL) Volatile Organic Compounds

Acetone	cis-1,2-Dichloroethylene
Benzene	trans-1,2-Dichloroethylene
Bromodichloromethane	1,2-Dichloropropane
Bromoform	cis-1,3-Dichloropropane
Bromomethane	trans-1,3-Dichloropropene
2-Butanone	Ethylbenzene
(Methyl ethyl ketone)	2-Hexanone
Carbon disulfide	4-Methyl-2-pentanone
Carbon tetrachloride	(Methyl iso-butyl ketone)
Chlorobenzene	Styrene
Chloroethane	1,1,2,2-Tetrachloroethane
Chloroform	Tetrachloroethylene
Chloromethane	Toluene
Dibromochloromethane	1,1,1-Trichloroethane
Dibromomethane	1,1,2-Trichloroethane
1,1-Dichloroethane	Trichloroethylene
1,2-Dichloroethane	Vinyl chloride
1,1-Dichloroethylene	Xylene (Total)

Target Compound List (TCL) Semivolatile Organic Compounds

Acenaphthene	4,6-Dinitro-2-methyl-phenol
Acenapthylene	2,4-Dinitrotoluene
Anthracene	2,6-Dinitrotoluene
Benz[a]anthracene	Di-n-octylphthalate
Benzo[b]fluoranthene	Fluoranthene
Benzo[k]fluoranthene	Fluorene
Benzo[g,h,I]perylene	Hexachlorobenzene
Benzo[a]pyrene	Hexachlorobutadiene
Bis(2-chloroethoxy)-methane	Hexachlorocyclopentadiene
Bis(2-chloroethyl)ether	Hexachloroethane
2,2-oxybix(1-Chloropropane)	Indenol[1,2,3-c,d]-pyrene
Bis(2-ethylhexyl)-phthalate	Isophorone
4-Bromophenyl phenyl ether	2-Methylnaphthalene
Butyl benzyl phthalate	2-Methylphenol (o-Cresol)
p-Chloroaniline	4-Methylphenol (p-Cresol)
4-chloro-3-methylphenol	2,4-Dinitrophenol
(p-chloro-m-cresol)	Napthalene
2-Chloronaphthalene	2-Nitroaniline
2-Chlorophenol	3-Nitroaniline
4-Chlorophenyl phenyl ether	4-Nitroaniline
Chrysene	Nitrobenzene
Dibenz[a,h]anthracene	2-Nitrophenol
Dibenzofuran	4-Nitrophenol
Di-n-butylphthalate	N-Nitrosodiphenylamine

Table 5-2
TCL/TAL Analyte List

1,2-Dichlorobenzene	N-Nitrosodi-n-propylamine
1,3-Dichlorobenzene	Pentachlorophenol
1,4-Dichlorobenzene	Phenanthrene
3,3'-Dichlorobenzidine	Carbazole
2,4-Dichlorophenol	Phenol
Diethylphthlate	Pyrene
2,4-Dimethylphenol	1,2,4-Trichlorobenzene
Dimethylphthlate	2,4,5-Trichlorophenol
	2,4,6-Trichlorophenol

Target Compound List (TCL) Pesticides and PCBs

Aldrin	4,4'-DDT
AROCLOR-1016	Dieldrin
AROCLOR-1221	Endosulfan I
AROCLOR-1232	Endosulfan II
AROCLOR-1242	Endosulfan sulfate
AROCLOR-1248	Endrin
AROCLOR-1254	endrin aldehyde
AROCLOR-1260	Heptachlor
alpha-BHC	Heptachlor epoxide
beta-BHC	methoxychlor
delta-BHC	Toxphene
gamma-BHC (Lindane)	Endrin ketone
4,4'-DDD	alpha-Chlordane
4,4'-DDE	gamma-Chlordane

Target Analyte List (TAL) Inorganic Constituents

Aluminum	Chromium
Calcium	Cobalt
Iron	Copper
Magnesium	Lead
Manganese	Mercury
Potassium	Nickel
Sodium	Selenium
Antimony	Silver
Arsenic	Thallium
Barium	Vanadium
Beryllium	Zinc
Cadmium	Cyanide

5.4.1 Property Cluster No. 1: 72 Sidney Street (a.k.a. 88 Money Street)

5.4.1.1 Description of Property Cluster No. 1

Property Cluster No. 1, 72 Sidney Street (a.k.a. 88 Money Street), is a vacant lot approximately half an acre in area. The property is covered by crushed stone and bordered by asphalt. The southeast portion of the property is inaccessible. Previously, Schenck Chevrolet, a used car dealership, used the property. A Sanborn map search revealed that in the 1950s the property was used as a gas station. Refer to Appendix A for further details regarding the property.

5.4.1.2 Logistical Concerns

Downhole gamma logging and soil borings are proposed within the crushed stone surface area. For these intrusive activities, potential past use of the property and underground stormwater utilities are logistical concerns. Because of past gas station operations, fuel oil and/or underground USTs may be encountered. Also, two pipes (approximately 48-inch diameter each) of the Lodi Brook run below the property. However, records of the easements for these pipes have not been located.

During a meeting with the USACE, the owner indicated that this property may be used by the Team as a temporary parking lot for displaced automobiles from the 80 Industrial Road property (Cluster No. 2), if necessary. The owner also indicated that a portion of the property (Lot 9) was recently sold.

5.4.1.3 Previous Investigations

***Radiological*:**

The initial radiological characterization was performed by Oak Ridge National Laboratory (ORNL) in 1989. A surface gamma scan did not reveal exposure rates in excess of the range due to natural background. Seven boreholes were installed to depths of approximately 8 feet and subsurface soil samples were collected for radionuclide analyses. Thorium-232 was identified as the primary contaminant of concern; a maximum concentration of 16 pCi/g was found. In general, thorium, and to a lesser extent, radium concentrations were elevated in samples collected at depths of approximately 2-4.5 feet.

BNI performed a radiological investigation in 1989, which consisted of collecting surface and subsurface soil samples for thorium, radium and uranium analysis. Boreholes were drilled and downhole gamma count rate data were collected. Surface soil samples did not contain significantly elevated concentrations of radionuclides of concern. Subsurface soil exhibited marginal contamination, with a maximum ^{232}Th concentration of 6.2 pCi/g. Gamma logging data indicated that the contaminated material was present in a layer approximately 2.5 feet below the ground surface located in the northern corner of the property, coinciding with where a portion of the former Lodi Brook and its associated floodplain were located. This was contrary to data presented by SAIC, which indicated that the contamination was located in the northeast corner of the property.

Geology:

Geologic borings conducted on-site in 1987 by BNI indicated a silty sandy gravel fill with coal, coal ash and plant fragments. This layer is underlain by gray clay with iron staining and some sand; silty sand, fine-grained with some gravel and iron nodules; silt, dark gray-brown in color, laminated; and fine- to medium- grained sand, yellowish-brown in color.

In a couple of soil borings, a layer of sandy gravel at a depth of 7.5 to 11 ft was found to contain large angular chunks which looked like riprap, which were saturated in an iridescent liquid with a strong fuel oil odor.

Geotechnical:

No previous geotechnical investigations were performed at this Property Cluster.

Environmental:

No previous environmental investigations were performed at this Property Cluster.

Geophysical:

No previous geophysical surveys were performed at this Property Cluster.

Hydrogeology:

Geologic boring logs indicate that groundwater was encountered at 6 to 8 ft below grade.

Civil/Survey:

No civil/survey information suitable for design has been identified for this Property Cluster.

Underground Utilities:

No detailed maps showing underground utilities have been identified for this Property Cluster.

5.4.1.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical and environmental surveys are shown in Figure 5-1.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, storage tanks, or fuel lines that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. All sample locations will be surveyed by a licensed surveyor upon completion of the work.

Underground Utilities:

Prior to intrusive activities, a record search will be conducted, and local utility companies will be contacted to "mark-out" their on-site utility locations. A geophysical survey of the property will be conducted (see above).

Radiological:

Previous investigations identified only subsurface contamination on this property. A surface walkover exposure rate scan will be conducted at the outset of the field investigation. A total of 13 locations have been identified for installation of shallow boreholes and collection of gamma logging data. Prior to borehole installation, in situ gamma spectroscopy measurements will be taken of surface soil at each of the proposed borehole locations. One-inch diameter boreholes will be installed manually and gamma logging data will be collected at six-inch intervals. If count rates suggest the presence of radionuclides of concern at greater depths, four-inch diameter push-pipes will be installed followed by collection of downhole in situ gamma spectroscopy data.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of four soil borings will be drilled. These include three geotechnical borings and one environmental boring. All soils will be visually classified in the field in a manner consistent with the Unified Soil Classification System (USCS) (ASTM D 2488), by a geologist or geotechnical engineer, in accordance with USACE Borehole Logging Requirements. In addition to describing the samples, the color of the sample, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs with additional pertinent information to be recorded in the field logbook.

Geotechnical:

Three geotechnical borings are planned in an area of suspected subsurface radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

Environmental:

One environmental boring is planned in an area of known radiological contamination. The depth of this boring will be determined in the field based on radiological contamination encountered. One sample will be collected from soil exhibiting maximum GM pancake detector count rates, or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from the borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.2 Property Cluster No. 2: 80 Hancock Street, 100 Hancock Street, 80 Industrial Road, and 8 Mill St. (NJVIS)

5.4.2.1 Description of Property Cluster No. 2

Property Cluster No. 2 consists of four properties: 80 Hancock Street, 100

Hancock Street, 80 Industrial Road, and 8 Mill St. (New Jersey Vehicle Inspection Station, or NJVIS). The property covers approximately 22 acres. Each property is active and contains a commercial building. The NJVIS is an active state motor vehicle inspection and driver test station and contains a drive-through open garage structure. The topography of the area is essentially flat and contains asphalt employee parking areas associated with each of the buildings. At 80 Industrial Road, an underground box culvert is located along the westerly border and a railroad spur is located along the south side of the property. Active transformers and storage tanks are present along the north side of 80 Hancock Street. A drainage swale and vertical drain inlet exists along the north side of 100 Hancock Street, which borders a residential property to the north. Refer to Figure 5-2 for mapping. Refer to Appendix A for a more detailed description of individual properties.

5.4.2.2 Logistical Concerns

Driveway access to 100 Hancock Street must be maintained for AT&T employees. Since push-pipes and soil borings are proposed within the driveway apron, this will require closure of the existing driveway. In meetings with USACE, it was noted by AT&T that access on the south drive from Hancock Street should be maintained. This may require that a maximum width of one-half of the driveway will be closed at any given time of work to allow uninterrupted vehicle flow. Traffic flow will be controlled by a dedicated flagman.

At 80 Hancock Street, the hours of operation are from 6:00 a.m. to 8:00 p.m. and there are emergency personnel at this location 24 hours/day. Driveway access for employees is also a concern and only one-half of the driveway will be closed at any given time. In meetings with USACE, it was emphasized that smoking, hot work, and lockout/tag are extremely important given the containerized gases on site.

The 80 Industrial Road property currently consists of two parking lots; one is used by employees and the other is rented to a Volvo dealer for storage of approximately 75-100 vehicles. In addition, the front lawn contains an underground sewer pumping station and a drainage easement. The Team will arrange to relocate the existing vehicles to a site approved by the property owner in order to complete PDI work. Also, driveway access will be maintained to minimize impact to existing operations.

Based on the proposed push-pipe and borehole locations, minimal impact to the NJVIS are anticipated.

5.4.2.3 Previous Investigations

Radiological:

At 80 Hancock Street and 100 Hancock Street, previous investigations identified surface and subsurface radiological contamination in the northwestern and southwestern quadrants of each property. At 80 Industrial, previous investigations identified surface and subsurface radiological contamination associated with the former Lodi Brook pathway. At the NJVIS, previous investigations identified surface and subsurface radiological contamination at the northern portion of the property and surface contamination at the southern portion of the property. Refer to Appendix A for further details regarding previous investigations.

Geology:

Based on previous investigations, Property Cluster No. 2 is underlain by urban fill which ranges in thickness from zero to six feet below grade. The urban fill is underlain by interbedded lenses of silts, clays and sands. At 80 Industrial Road, weathered bedrock is approximately 13 feet below grade in the northeastern corner of the property. The property cluster is within the area of the historic Lodi Brook channel. Refer to Appendix A for a more detailed description of individual properties.

Geotechnical:

Geotechnical investigations were not performed at Property Cluster No. 2.

Environmental:

Environmental investigations were not performed at Property Cluster No. 2.

Geophysical:

Geophysical surveys were not performed at Property Cluster No. 2.

Hydrogeology:

There were no previous hydrogeologic studies performed at Property Cluster No. 2. However, based on previous borehole information, the depth to groundwater ranges from approximately four to twelve feet below grade.

Civil/Survey:

Civil/survey information suitable for design has not been identified for Property Cluster No. 2.

Underground Utilities:

Detailed maps that depict underground utilities in the area have not been identified for Property Cluster No. 2.

5.4.2.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical and environmental surveys are shown in Figure 5-2.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, storage tanks, or fuel lines that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. A licensed surveyor will survey all as-built sample locations.

Underground Utilities:

Local utilities will be contacted to "mark-out" existing utilities prior to initiating the PDI investigations. A geophysical survey will be conducted at the property cluster (see above).

Radiological:

A surface walkover exposure rate scan will be conducted at the outset of the field investigations at all properties in the cluster, followed by installation of four-inch diameter push-pipes. In-situ gamma spectroscopy will be performed following each push-pipe installation. A total of 18, 17, 23, and 28 push-pipes will be installed at 80 Hancock Street, 100 Hancock Street, 80 Industrial Road, and NJVIS, respectively. These include push-pipes at one background location on each property.

At the NJVIS, existing data from previous investigations indicate that contamination located in the southeast portion of the property is limited to surface and/or near-surface soil. Therefore, approximately 10 shallow, manually installed, one-inch diameter boreholes will be installed, rather than push-pipes. Gross downhole gamma count rates will be collected at six-inch intervals throughout each borehole. If count rates suggest the presence of radionuclides of concern at greater depths, additional four-inch diameter push-pipes will be installed, followed by collection of downhole in situ gamma spectroscopy data.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of 30 environmental and geotechnical soil borings will be drilled at Property Cluster No. 2. All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or geotechnical engineer. In addition to sample description, the sample color, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs and in field logbooks.

Geotechnical:

A total of 22 geotechnical soil borings are planned at Cluster No. 2 in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

If radiological contamination is encountered adjacent to structures and deeper than the foundation level, additional geotechnical laboratory testing and analyses may be required as part of the remediation work. Additional testing includes triaxial tests and consolidation tests on undisturbed tube samples of fine-grained (i.e., silt and/or clay) soils, if encountered. Triaxial testing may be required to perform bearing capacity and/or slope stability analyses to determine safe excavation slopes adjacent to foundations. Consolidation tests may be needed to analyze and estimate potential settlements if dewatering is required for PDI work.

80 Hancock Street: Five geotechnical borings are proposed at 80 Hancock Street. Two of these borings are placed along the property lines adjacent to Industrial Road and Hancock Street. The remaining three borings are placed around the outside of the building in the area where the proposed excavation coincides with the building footprint.

100 Hancock Street: Five geotechnical borings are planned at 100 Hancock Street. Two of these borings are placed along the property line adjacent to Hancock Street (as a continuation of the boring coverage proposed at 80 Hancock Street). One boring is located along the south side of the building in the area where the proposed excavation coincides with the building footprint and another boring is placed in the area south of the building where known radiological contamination is present. One boring is placed along the northern property boundary and the rail line.

80 Industrial Road: A total of six geotechnical borings are planned at 80 Industrial Road. One geotechnical boring is located along the property line adjacent to

Industrial Road, and two geotechnical borings are located along Hancock St. Three borings are located around the perimeter of the building in areas where the proposed excavation coincides with the building footprint.

NJVIS: Six geotechnical borings are planned at the NJVIS. Two borings are planned along the property lines adjacent to Hancock Street and Columbia Lane. One boring is located in the area of the driver testing roadway in an area of known radiological contamination. One boring is located adjacent to the inspection building. One boring is located along the northern property line and the remaining boring is located along Gregg Street.

Environmental:

A total of 9 environmental soil borings are planned at property Cluster No. 2 in areas of known radiological contamination. The depths of these borings will be determined in the field based on radiological contamination encountered. The samples will be collected from soil exhibiting maximum GM pancake detector count rates, or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary. One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

80 Hancock Street: At 80 Hancock, a total of two environmental borings will be advanced within the elevated radiological areas. One boring is located in the asphalt area along the south side of the existing building and one boring is located adjacent to the grass drainage easement along the western edge of the property.

100 Hancock Street: At 100 Hancock Street, two environmental borings are planned within the elevated radiological areas. The borings are located along the perimeter of the property: one along the south and one along the north property boundary.

80 Industrial Road: At 80 Industrial Road, two environmental borings are planned within the elevated radiological areas. One environmental boring is located on the west side of the existing building and the second boring is located along the south property line.

NJVIS: At the NJVIS, a total of three environmental borings are planned . Two borings are located within the driving school area of the NJVIS. One boring is located near the eastern property border with Gregg Street.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.3 Property Cluster No. 3: 170 Gregg Street (Bergen Cable)

5.4.3.1 Description of Property Cluster No. 3

Property Cluster No. 3 170 Gregg Street (Bergen Cable) encompasses approximately 130,000 square feet. The property contains one building which occupies approximately 74,250 square feet and is constructed of cinder block with brick veneer. A partially paved asphalt area and disturbed grass and gravel area (formerly a known UST location) exists in the southeast section of the property. Refer to Appendix A for further details regarding the property.

5.4.3.2 Logistical Concerns

Downhole gamma logging and soil borings are proposed in the open southeast section of the property. Driveway access, parking considerations, and employee access to the existing building are logistical concerns at this property. Also, there is a rail spur located adjacent to the property line. If sampling indicates that excavation is required in this area, then coordination with the railroad operator will be required. Based on the proposed downhole gamma logging and soil boring locations, minimal disturbance of the existing operations is anticipated. However, temporary relocation of vehicles may be required which will be coordinated with the existing tenants and building management. Based on meetings with the owner's representative and the USACE, the facility operates five days a week, eight hours per day. However, it was noted that PDI activities would have no impact on facility operations. There are approximately 35 to 40 employees at the facility who are engaged in the fabrication and sales of steel cable for industrial use. The working hours and number of employees may have changed since the 1986 report. This information should be verified with the facility manager prior to initiating investigation activities.

5.4.3.3 Previous Investigations

Radiological:

Previous radiological investigations identified surface and near-surface contamination in two locations based on gamma logging data from 41 boreholes. Subsurface contamination was defined as having thorium and radium concentrations that exceed 15 pCi/g. Refer to Appendix A for further details regarding previous investigations.

Geological:

No site-specific geologic borings were located for Property Cluster No. 3. A general stratigraphic description of the area may be found in Section 3 of this Work Plan.

Geotechnical:

Geotechnical investigations were not performed at Property Cluster No. 3.

Environmental:

Site-specific environmental sampling was not conducted at Property Cluster No. 3.

Geophysical:

Geophysical surveys were not performed at Property Cluster No. 3.

Hydrogeology:

There were no hydrogeologic studies performed at Property Cluster No. 3.

Civil/Survey:

No civil/survey information suitable for design has been identified for Property Cluster No. 3.

Underground Utilities:

No detailed maps that depict underground utilities in the area have been identified.

5.4.3.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical, and environmental surveys are shown in Figure 5-3.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, storage tanks, or fuel lines that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. A licensed surveyor will survey all sample locations.

Underground Utilities:

Local utilities will be contacted to "mark-out" existing utilities prior to initiating the PDI investigations. A geophysical survey will be conducted at the property cluster.

Radiological:

A surface walkover exposure rate scan will be conducted at the outset of the field investigation. Ten locations (including one background location) have been identified for installation of shallow boreholes and collection of gamma logging data. Prior to borehole installation, in situ gamma spectroscopy measurements will be taken of surface soil at each of the proposed borehole locations. One-inch diameter boreholes will be installed manually and gamma logging data will be collected at six-inch intervals. If count rates suggest the presence of radionuclides of concern at greater depths, four-inch diameter push-pipes will be installed, followed by collection of downhole in situ gamma spectroscopy data.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of three soil borings will be drilled at Property Cluster No. 3. These include two geotechnical borings and one environmental boring. All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or geotechnical engineer. In addition to sample description, the sample color, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs and in field logbooks.

Geotechnical:

Two geotechnical soil borings are planned in areas of known radiological contamination at Property Cluster No. 3. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

The two borings are located in the grass/gravel area in the eastern corner of the property, near the site entrance.

Environmental:

At Property Cluster No. 3, one environmental boring is planned in an area of known radiological contamination located in the eastern grass/gravel area. The depth of this boring will be determined in the field based upon the results of the radiological investigation. The sample will consist of soil exhibiting maximum GM pancake detector count rates or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.4 Property Cluster No. 4: 160/174 Essex Street (BONY) and I-80 Westbound Right-of-Way

5.4.4.1 Description of Property Cluster No. 4

Property Cluster No. 4, 160/174 Essex Street (BONY) and I-80 Westbound Right-of-Way, is located south (across Essex Street) of Property Cluster No. 5. A single-story stucco office building and small storage building are located at 174 Essex Street and are the only structures associated with Property Cluster No. 4. Property Cluster No. 4 is surrounded by asphalt paved areas. A below grade culvert (the Lodi Brook Culvert) transects the cluster on the Essex Street property from Essex Street to the above ground exposed Lodi Brook near the I-80 Westbound Right-of-Way. The I-80 Westbound

Right-of-Way is fenced to the north and located adjacent to the 160 Essex Street property. Refer to Figure 5-4 for mapping. Refer to Appendix A for further details regarding the properties.

5.4.4.2 Logistical Concerns

Downhole gamma logging, push-pipes, and soil borings are proposed in the open parking areas of 160/174 Essex Street and the eastern end of I-80 Westbound Right-of-Way. Discussions with the NJDOT have confirmed that access and coordination with planned upgrade work at the property are not logistical concerns. Based on the proposed sampling locations, minimal disturbance of the existing operations is anticipated through planned coordination efforts. Access to the I-80 Right-of-Way is from Essex Street through a connecting gate from the north section of the 160 Essex Street property. The Lodi Brook is open in a small area perpendicular to the I-80 Right-of-Way and along the southeast portion of 160 Essex Street.

The BONY is currently planning an expansion to the current workforce at 174 Essex Street by the fall of 1999. At present, the office is occupied by less than 20 people and the facility is operational five days per week. As part of the expansion, the existing generator and associated electrical upgrade work is planned. The generator is located on the west side of the building. The plans to upgrade include trenching straight to Essex Street. The western edge of the trenching would be approximately 40 feet from the building. BONY will conduct soil sampling in the area of the trenching to determine the presence or absence of thorium contamination.

5.4.4.3 Previous Investigations

Radiological:

Previous radiological investigations identified moderate to shallow contamination to the south of the Lodi Brook Culvert. Subsurface contamination (up to six feet below grade) exists at 160/174 Essex Street. At the I-80 Westbound Right-of-Way, a surface gamma scan identified slightly elevated exposure rates in the east corner of the right-of-way, west of the exposed portion of the Lodi Brook to depths of five feet below grade. Refer to Appendix A for further details regarding previous investigations.

Geology:

Based on previous investigations, the 160/174 Essex Street property is underlain by unconsolidated sands, silts and gravel. Competent bedrock, below the existing overburden, has been encountered at 6.5 to 8.0 feet below grade. The competent bedrock is fractured and red in color. Generally, one to two feet of weathered bedrock lies above competent bedrock. At I-80 Westbound Right-of-Way, a silty sand fill has been observed in subsurface soils. The fill is grayish black to brown and contains a matrix of brick fragments and debris.

Geotechnical:

Geotechnical investigations were not performed at Property Cluster No. 4.

Environmental:

Environmental investigations were not performed at Property Cluster No. 4.

Geophysical:

Geophysical surveys were not performed at Property Cluster No. 4.

Hydrogeology:

There were no previous site-specific hydrogeological studies performed at Property Cluster No. 4. However, based on previous borehole information, the depth to groundwater ranges from approximately 7 to 10 feet below existing grade at the I-80 Westbound Right-of-Way, and approximately 4.9 to 10.9 feet below grade at the 160/174 Essex Street property.

Civil/Survey:

Civil/survey information suitable for design has not been identified for Property Cluster No. 4.

Underground Utilities:

Detailed maps that depict underground utilities have not been identified for Property Cluster No. 4.

5.4.4.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical and environmental surveys are shown in Figure 5-4.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, storage tanks, or fuel lines that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. A licensed surveyor will survey all as-built sample locations.

Underground Utilities:

Local utilities will be contacted to "mark-out" existing utilities prior to initiating the PDI investigations. A geophysical survey will be conducted at the property cluster (see above).

Radiological:

160/174 Essex Street: A surface walkover exposure rate scan will be conducted at the outset of the field investigation, followed by push-pipe installation and downhole in-situ gamma spectroscopy. A total of 26 four-inch push-pipes will be installed at 160/174 Essex Street.

I-80 Westbound Right-of-Way: A surface walkover exposure rate scan will be conducted at the outset of the field investigation in the southeastern portion of the property, since previous investigations limit the areas of concern to the area proximate to Lodi Brook. Three locations (including one background location) have been identified for installation of shallow boreholes and collection of gamma logging data. Prior to borehole installation, in-situ gamma spectroscopy measurements will be taken of surface soil at each of the proposed borehole locations. One-inch diameter boreholes will be installed manually and gamma logging data will be collected at six-inch intervals. If count rates suggest the presence of radionuclides of concern at greater depths, four-inch diameter push-pipes will be installed, followed by collection of downhole in-situ gamma spectroscopy data. Push-pipes will be installed in four locations, including one background, at the eastern end of the property followed by collection of in-situ gamma spectroscopy data within each push-pipe.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of 7 soil borings will be drilled at Property Cluster No. 4. These include 4 geotechnical and 3 environmental borings. All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or geotechnical engineer. In addition to a sample description, the sample color, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs and in field logbooks.

Geotechnical:

A total of 4 geotechnical soil borings are planned at Property Cluster No. 4 in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity.

Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

If radiological contamination is encountered adjacent to structures and deeper than the foundation level, additional geotechnical laboratory testing and analyses may be required as part of the remediation work. Additional testing includes triaxial tests and consolidation tests on undisturbed tube samples of fine-grained (i.e., silt and/or clay) soils. Triaxial testing may be required to perform bearing capacity and/or slope stability analyses to determine safe excavation slopes adjacent to foundations. Consolidation tests may be needed to analyze and estimate potential settlements if dewatering is required for remediation.

160/174 Essex Street: A total of 4 borings are proposed at 160/174 Essex Street. One geotechnical boring is located along the property lines adjacent to I-80. Two geotechnical borings are adjacent to the smaller building in the extreme southeast corner of the site. One geotechnical boring is located along the eastern side of the 160 Essex Street property.

I-80 Westbound Right-of-Way: One geotechnical boring is planned for I-80 Westbound Right-of-Way in an area of suspected radiological contamination.

Environmental:

A total of three borings are planned in areas of known radiological contamination. The depths of these borings will be determined in the field based upon the results of the radiological investigation. Samples will consist of soil exhibiting maximum GM pancake detector count rates or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

160/174 Essex Street: At 160/174 Essex Street, two environmental borings are planned, one located at the eastern side of 160 Essex Street and the second located at the southeastern end of 174 Essex Street.

I-80 Westbound Right-of-Way: One environmental boring is located in the southeast corner of the property, west of the Lodi Brook.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.5 Property Cluster No. 5: 99 Essex Street (Muscarelle), 113 Essex Street (BONY), and 200 Route 17 South (Sears Small Truck Repair)

5.4.5.1 Description of Property Cluster No. 5

This Cluster of properties extends from the corner of Essex Street and Route 17 South (adjacent to the Route 17 South exit ramp from Essex Street) along the east side of Essex Street to the 200 Route 17 South property. Each property contains one multi-storied building and is surrounded by asphalt pavement with small landscaped areas adjacent to each building. A landscaped pond is located at the southeast corner of the building at 99 Essex St. Refer to Figure 5-5 for details. For a more detailed description of each property, refer to Appendix A.

5.4.5.2 Logistical Concerns

Downhole gamma logging and soil borings are proposed within the grass and asphalt areas and near the employee entrances. The basement of the building at 99 Essex Street (Muscarelle property) contains active offices, storage areas, and a boiler room. The building has a north and south employee entrance and driveway access via two driveway aprons off Essex Street. Employees are present five days a week, eight hours a day. In addition, an existing 5,000-gallon underground storage tank (UST) is located on the Muscarelle property. Special care will be taken to protect the 5,000-gallon tank, all existing fuel lines and the landscaped pond.

The 113 Essex Street property (BONY) will require close attention to determine how to minimize impact to the facility as PDI activities are planned in the area around the main entrance.

The 200 Route 17 South property (Sears small truck repair center) is accessed from Route 17 South, which lies just east of the property. This driveway area was previously found to be contaminated with subsurface radioactive contamination. The facility is operated six days per week (number of hours unknown) and has approximately 30 to 35 employees. Most of the property's exterior is covered by asphalt pavement. An open, unconfined portion of Lodi Brook flows parallel with Route 17 South along the southeastern property boundary. At the southern end of the building, in the parking area, there is a buried petroleum tank (size unknown) used to fuel delivery/service vehicles operated by the Sears facility (exact location unknown). Coordination with the NJDOT regarding expansion of Route 17 will be necessary.

Driveway access, parking consideration, and employee access are logistical concerns at all three properties. Alternative access to the Sears facility from the adjacent BONY property will be assessed. Driveway access will be maintained at all times and vehicle traffic flow will be controlled with the use of dedicated flagmen, barricades, lights, signs, and other precautionary measures necessary to provide safe work conditions. Based on proposed push-pipe/borehole locations, some vehicles may be required to relocate temporarily in order to perform the planned PDI work. The Team will coordinate all temporary vehicle relocation and PDI scheduling in advance of PDI work to minimize any inconvenience to existing tenants. In addition, employee/pedestrian access areas will be maintained or alternate routes will be developed so that employees/pedestrians may be accommodated during the PDI work.

5.4.5.3 Previous Investigations

Radiological:

At 99 Essex Street, previous radiological investigations identified surface and near-surface contamination at three locations (15 pCi/g maximum of ^{232}Th).

At 113 Essex Street, previous radiological investigation identified both surface and subsurface contamination.

At 200 Route 17 South, previous investigations identified surface and subsurface contamination which cover less than 10 percent of the property (approximately 160 x 40 feet). The contamination is localized and present in the southeastern portion of the property and slightly extends outside the fence line. Refer to Appendix A for more details.

Geology:

Detailed site-specific geological information is not available for Property Cluster No. 5.

Geotechnical:

Geotechnical investigations were not performed at Property Cluster No. 5.

Environmental:

At 99 Essex Street, environmental soil samples were collected during the removal of a 2,000-gallon UST. Sampling results indicated that no contamination was detected above NJDEP cleanup criteria. There were no previous environmental investigations conducted at 113 Essex Street. At 200 Route 17 South, two boreholes (C570 and C628) were sampled for chemical characterization. Soil samples were analyzed for VOCs, BNAs, metals, rare earths, reactivity, corrosivity, and TPH. Borehole C570 was identified as radioactively contaminated (RI Report, 1992).

Geophysical:

A GPR survey was conducted at the 99 Essex Street property in 1990. The purpose of the GPR investigation was to identify and delineate the extent of the buried Lodi Brook channel. Possible stream channel boundaries along the western side of the property in the present day parking lot and a culvert (north end of site) were identified. No other geophysical surveys were conducted at Property Cluster No. 5.

Hydrogeology:

Hydrogeologic investigations were not performed at Property Cluster No. 5.

Civil/Survey:

No civil/survey information suitable for design has been identified for Property Cluster No. 5.

Underground Utilities:

No detailed maps that depict underground utilities have been identified for Property Cluster No. 5.

5.4.5.4 Proposed Field Sampling Activities

Geophysical:

A geophysical survey (EM and magnetometer) will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, underground storage tanks, and fuel lines, which may impact intrusive activities. Once the location of utilities/tanks are identified by the geophysical surveys or utility companies and "marked-out," special care will be taken to avoid these facilities including relocation of planned push-pipes/boreholes, if necessary.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. Following completion of the work, a licensed surveyor will survey all as-built sample locations.

Underground Utilities:

A record search will be conducted, and local utility companies will be contacted to "mark-out" their on-site utility locations. A geophysical survey of the property will be conducted (see above).

Radiological:

99 Essex Street (Muscarelle): Previous investigations identified surface and near-surface contamination (depth of one to three feet) at three locations (15 pCi/g maximum of ^{232}Th).

A surface walkover exposure rate scan will be conducted at the outset of the field investigation. Several locations have been identified for installation of shallow boreholes and collection of gamma logging data. Prior to borehole installation, in situ gamma spectroscopy measurements will be taken of surface soil at each of the proposed borehole locations. One-inch diameter boreholes will be installed manually and gamma logging data will be collected at six-inch intervals. If count rates suggest the presence of radionuclides of concern at greater depths, four-inch diameter push-pipes will be installed, followed by collection of downhole in situ gamma spectroscopy data. Push-pipes will be installed in areas covered with concrete or asphalt where downhole gamma logging cannot be performed manually, some of which coincide with the former location of the Lodi Brook.

A total of 29 shallow downhole gamma logging boreholes, including one background location, will be installed at this property. In addition, nine push-pipes, including one background location, are currently planned; that number could increase should shallow downhole gamma logging data indicate the presence of contamination at greater depths than suggested by previous investigations.

113 Essex Street (BONY): Previous investigations identified both surface and subsurface contamination in two areas of the property.

A surface walkover exposure rate scan will be conducted at the outset of the field investigation, followed by installation of four-inch diameter push-pipes. In-situ gamma spectroscopy will be performed following each push-pipe installation. A total of 18 push-pipes, including one in a background location, will be installed to 10 feet below existing grade.

200 Route 17 South (Sears Small Truck Repair): Previous investigations identified both surface and subsurface contamination in an area of the property, which coincides with the former channel of the Lodi Brook.

A surface walkover exposure rate scan will be conducted at the outset of the field investigation, followed by installation of four-inch diameter push-pipes. In-situ gamma spectroscopy will be performed following each push-pipe installation. Twenty-three push-pipes, including one in a background location, will be installed to 10 feet below existing grade.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of 11 soil borings are planned at Cluster No. 5 properties. These include 8 geotechnical borings and 3 environmental borings. All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or geotechnical engineer. In addition to sample description, the sample color, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on boring logs and in field logbooks. See Figure 5-5 for all boring locations.

Geotechnical:

A total of 8 geotechnical soil borings are planned at Property Cluster No. 5 in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

If radiological contamination is encountered adjacent to structures and deeper than the foundation level, additional geotechnical laboratory testing and analyses may be required as part of the remediation work. Additional testing includes triaxial tests and consolidation tests on undisturbed tube samples of fine-grained (i.e., silt and/or clay) soils. Triaxial testing may be required to perform bearing capacity and/or slope stability analyses to determine safe excavation slopes adjacent to foundations. Consolidation tests may be needed to analyze and estimate potential settlements if dewatering is required for remediation.

99 Essex St. (Muscarelle): Three geotechnical borings are planned in areas of known radiological contamination. One boring is located along the property line adjacent to the Route 17 Exit Ramp and Essex Street. Two borings are located around the outside of the building, where the proposed excavations coincide with the building footprint.

113 Essex St. (BONY): Three geotechnical borings are planned at the BONY site. Two geotechnical borings are located along the perimeter of the building at the southeastern and northeastern ends of the building, respectively. The remaining boring is located at the northeast end of the property.

200 Route 17 South (Sears Small Truck Repair): Two geotechnical borings are planned at this property. One boring is located along the eastern property line adjacent to Route 17. One geotechnical boring is located on the eastern side of the aboveground Lodi Brook in the southeastern corner of the property.

Environmental:

Three soil borings are planned in areas of known radiological contamination. The depths of these borings will be determined in the field based upon the results of the radiological investigation. The samples will be collected from soil exhibiting maximum GM pancake detector count rates, or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

99 Essex Street (Muscarelle): One environmental soil boring is planned adjacent to the northwest corner of the building.

113 Essex Street (BONY): At 113 Essex Street, one environmental soil boring is planned. within an anomalous radiological area located near the southeast corners of the building.

200 Route 17 South (Sears Small Truck Repair): One environmental soil boring is planned in the southeast portion of the property where known radiological contamination exists. This location also coincides with the present day Lodi Brook channel.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.6 Property Cluster No. 6: 29 Essex St. (FedEx), 85-101 Rt. 17N (Hunter Douglas, SWS Realty), 137 Rt. 17N (AMP Realty), 167 Rt. 17N (Sunoco Station), and 239 Rt. 17N (Gulf Station)

5.4.6.1 Description of Property Cluster No. 6

Property Cluster No. 6 consists of five properties: 29 Essex St. (Federal Express), 85-101 Rt. 17N (Hunter Douglas, SWS Realty), 137 Rt. 17N (Uniform Fashions), 167 Rt. 17N (Sunoco Station), and 239 Rt. 17N (Gulf Station). These properties cover approximately 13 acres. Each is an active commercial business, with the exception of 167 Rt. 17N, a former Sunoco Station with a one-story building. There are asphalt parking areas on each of the properties. A drainage channel traverses the 85-101 Rt. 17N, 137 Rt. 17N and 167 Rt. 17N properties. Refer to Appendix A for a more detailed description of the individual properties.

5.4.6.2 Logistical Concerns

Uninterrupted vehicle and employee access must be maintained at 29 Essex Street, the Federal Express property, during the proposed field activities for the PDI.

The property at 85-101 Rt. 17N consists of one building known as the Hunter

Douglas Building, which is currently owned by SWS Realty Associates. The building is leased to the following tenants: Architectural Window Manufacturing Corporation, Meta-Lite Custom Fabricators, and Computer Service Center. Operating hours are approximately from 6 a.m. to 6 p.m. Monday to Friday, and a half day on Saturday. It is anticipated that Meta-Lite will vacate the building in the latter part of 1999, and that their space will be taken over by Architectural Windows. Architectural Windows receives regular window shipments; investigation activities must be coordinated with these shipment times. An UST, which stored gasoline, was removed from the north side of the building; there is currently an air sparging remediation system in place to treat a groundwater plume, which resulted from a UST leak. The site is currently listed as a state hazardous waste site (Facility ID NJD982186306). Investigation activities will be coordinated with the remediation contractor (Accu-Tech) to minimize impacts on the ongoing remedial activities.

The 137 Rt. 17 property is owned by AMP Realty Associates and is currently leased to Uniform Fashions, which manufactures uniforms for medical and food service personnel. Hours of operation extend into the evening; the facility also has weekend hours of operation.

The 167 Rt. 17 site was formerly a Sunoco station but is currently inactive. This site could potentially be used as a staging area for investigation activities for Cluster No. 6. According to the CH2M Hill RI (M-575, 1994), 3 former gasoline USTs were removed from the property, but a 550-gallon waste oil UST remains in the southwestern corner.

The property at 239 Rt. 17N is an active Gulf Service Station owned by Cumberland Farms, and operates 24 hours per day, seven days per week. A 1994 report (M-698) noted that the station employs one person on each work shift. Investigation activities will be coordinated with customer traffic at 239 Rt. 17N. Planned activities along Route 17 will require coordination with NJDOT.

5.4.6.3 Previous Investigations

Radiological:

Previous investigations identified surface and subsurface contamination at the 85-101 Rt. 17N, 137 Rte 17N, and 167 Rt. 17N properties. At each of these properties, radiological contamination was found in the area of the drainage channel of the Lodi Brook. Limited radiological data were available for the properties at 239 Rt. 17N and 29 Essex Street. Refer to Appendix A for further details regarding previous investigations.

Geology:

Based on previous investigations, Property Cluster No. 6 is underlain by fill materials and decomposed sandstone of the Brunswick Formation. Fill materials consist mostly of disturbed residual soil and reddish glacial alluvium from approximately 0 to 6 feet below existing grade. The top of the weathered bedrock varies at all of the cluster properties, and ranges from approximately 0.75 feet to 13 feet below grade. Refer to Appendix A for a more detailed description of individual properties.

Geotechnical:

Geotechnical laboratory testing was conducted for one sample from the 29 Essex St. property. Soil from the 0-6 foot depth interval, composed of recent and stratified glacial deposits, was analyzed for grain size distribution, Atterberg limits, and moisture content. The results of the grain size distribution indicated that the sample contained 6.7 percent gravel, 64.4 percent sand, 21.1 percent silt, and 7.8 percent clay. The sample's liquid limit was 17, the plasticity index was 2, and the moisture content was 13.7 percent. No geotechnical laboratory tests were conducted for the other properties within Cluster No. 6.

Environmental:

Limited environmental investigations were performed at 167 Rt. 17N and 85-101 Rt. 17N during initial radiological investigations completed by BNI in 1987. One composited soil sample was collected from each property and analyzed for VOCs, BNAEs, priority pollutant metals, pesticides, PCBs, and EP toxicity. Cadmium was detected at above background levels in the samples from both of the properties. Naphthalene, 2-methylnapthalene, and bis(2-ethylhexyl) phthalate were detected in the sample from the 85-101 Rt. 17N property.

During the investigations for the RI performed by CH2M Hill (M-575), 11 borings were installed on four of the five Property Cluster No. 6 properties (no borings were installed on the 239 Rt. 17N property). Samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TAL metals and cyanide, and TCLP VOCs, SVOCs, herbicides, pesticides, and metals. High concentrations of VOCs, particularly the BTEX compounds, were detected in samples from the 85-101 Rt. 17N property. These samples were taken from a location near the former location of a UST used to hold gasoline. Naphthalene and 2-methylnaphthalene were also detected in samples from the 85-101 Rt. 17N property. Bis(2-ethylhexyl) phthalate and di-n-butyl phthalate were detected at the 167 Rt. 17N property at concentrations of 2,600 ppb and 520 ppb, respectively. No caffeine, d-limonene, a-pinene, pesticides or PCBs were detected in the samples collected at the Property Cluster No. 6 properties. Samples from the 167 Rt. 17N, 85-101 Rt. 17N and 137 Rt. 17N properties exceeded the 1 ppm NJDEP cleanup standard for cadmium (maximum concentration was 4 ppm). Samples from the 167 Rt. 17N and 85-101 Rt. 17N properties exceeded the 100 ppm NJDEP soil cleanup standard for lead (maximum concentration was 204 ppm).

For additional details regarding previous environmental investigations refer to Appendix A.

Geophysical:

As part of the RI performed by CH2M Hill (M-575), surface geophysical investigation surveys were performed at all of the Property Cluster No. 6 properties from September 1991 to March 1992. Magnetometer surveys were used in an effort to locate and define ferromagnetic containers in the overburden soils that could potentially be sources of chemical contamination. Based on the results of the geophysical survey, 34 test pits were excavated at four of the five Property Cluster No. 6 properties (no test pits were excavated at the 239 Rt. 17N property). No drums were found at any of the Property Cluster No. 6 properties.

Hydrogeology:

There are nine monitoring wells on the Cluster No. 6 properties: 239 Rt. 17N, 167 Rt. 17N, and 85-101 Rt. 17N each have a bedrock and overburden monitoring well cluster; 29 Essex St. has a bedrock/overburden monitoring well cluster in the eastern part of the property and a bedrock monitoring well in the southwestern corner of the property; 137 Rt. 17N does not have any monitoring wells. Depth to the water table varies from approximately four feet to 16 feet. In general, groundwater in both the overburden and the bedrock flows southward beneath the Cluster No. 6 properties. A branch of the historic drainage channel of the Lodi Brook traverses 85-101 Rt. 17, 137 Rt. 17, and 167 Rt. 17 properties (see Figure 5-6).

Civil/Survey:

No detailed site base maps, topographic information, or property boundary maps have been identified for Property Cluster No. 6.

Underground Utilities:

Detailed maps that depict underground utilities in the area of Property Cluster No. 6 have not been identified.

5.4.6.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical, and environmental surveys are shown on Figure 5-6.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, storage tanks, or fuel lines that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. All as-built sample locations will be surveyed by a licensed surveyor.

Underground Utilities:

Local utilities will be contacted to "mark-out" existing utilities prior to initiating the PDI investigations. A geophysical survey will be conducted at the property cluster (see above).

Radiological:

A surface walkover exposure rate scan will be conducted at the outset of the field investigations at all properties in the cluster. The walkover at 29 Essex Street will be limited to the northern portion of the property (approximately 15 percent of the total property) since previous investigations limit the areas of concern to the area proximate to Lodi Brook. If elevated exposure rates are found in this area, the scanning will continue until background exposure rates have been established. Following the walkover scan, downhole gamma logging and/or push-pipe installation will be performed. In-situ gamma spectroscopy will be performed following each push-pipe installation. The proposed radiological sampling includes four-inch diameter push-pipe installation at the 239 Rt. 17N (19 locations), 167 Rt. 17N (27 locations), 137 Rt. 17N (15 locations, including a background push pipe), and 85-101 Rt. 17N (11 locations including a background push-pipe) properties. One-inch diameter shallow borehole installation with downhole gamma logging, will be conducted at the 85-101 Rt. 17 N property (six locations including a background location) and the 29 Essex St. property (7 locations).

Gross downhole gamma count rates will be collected at six-inch intervals throughout each borehole. If count rates suggest the presence of radionuclides of concern at greater depths, additional push-pipes will be installed, followed by collection of downhole in situ gamma spectroscopy data.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of 17 geotechnical and environmental soil borings will be drilled at Property Cluster No. 6. All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or geotechnical engineer. In addition to sample description, the sample color, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs and in field logbooks. At each boring, an average of three samples, potentially each from different soil types, will be selected for geotechnical laboratory analyses. These analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity.

Geotechnical:

A total of 12 geotechnical soil borings are planned at Property Cluster No. 6 in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

If radiological contamination is encountered adjacent to structures and deeper than the foundation level, additional geotechnical laboratory testing and analyses may be required as part of the remediation work. Additional testing includes triaxial tests and consolidation tests on undisturbed tube samples of fine-grained (i.e., silt and/or clay) soils. Triaxial testing may be required to perform bearing capacity and/or slope stability analyses to determine safe excavation slopes adjacent to foundations. Consolidation tests may be needed to analyze and estimate potential settlements if dewatering is required for remediation.

29 Essex St. One geotechnical boring is planned at 29 Essex Street. It is located adjacent to the drainage pond at the north eastern end of the property.

85-101 Rt. 17 N: Three geotechnical borings are planned at 85-101 Rt. 17N. Two borings are located around the eastern perimeter of the building in the area where the proposed excavation coincides with the building footprint. One additional boring is proposed in the northern portion of the site, within the proposed excavation area along the drainage channel.

137 Rt. 17N: Four geotechnical borings are planned at 137 Rt. 17N. All four borings are located around the perimeter of the building in the area where the proposed excavation coincides with the building footprint.

167 Rt. 17N: Three geotechnical borings are planned at the 167 Rt. 17N property. One geotechnical boring is located adjacent to the building in a potential remediation area. Two geotechnical boring is proposed in the central portion of the site, within the proposed excavation area.

239 Rt. 17N: One geotechnical boring is planned at the 239 Rt. 17N property. This boring is located in the eastern portion of the site, within the proposed excavation area.

Environmental:

A total of six environmental borings are planned at Property Cluster No. 6 in areas of known radiological contamination. The depths of these borings will be determined in the field based upon the results of the radiological investigation. Samples will consist of soil exhibiting maximum GM pancake detector count rates or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

29 Essex St.: One environmental borings is planned at 29 Essex Street. This boring is located adjacent to the retention pond at the northeastern border of the property.

85-101 Rt. 17N: One environmental soil boring is planned at the 85-101 Rt. 17N property. This boring is located adjacent to a drainage channel located along the northern property boundary.

137 Rt. 17N: Two environmental borings are planned at the 137 Rt. 17N property. One borehole is located on the east side of the existing building, adjacent to an existing drainage channel. The remaining boring is located at the northern property boundary, following the path of the drainage channel.

167 Rt. 17N: One environmental borings are planned for the 167 Rt. 17N property. This boring is located on the east side of the existing building in an area of known radiological contamination.

239 Rt. 17N: One environmental boring is planned at the 239 Rt. 17N property The boring is located at the eastern end of the property in an area of known radiological contamination.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.7 Property Cluster No. 7: 111 Essex Street (Scanel/Hackensack and Lodi Railroad)

5.4.7.1 Description of Property Cluster No. 7

Property Cluster No. 7 consists of one property: 111 Essex Street

(Scanel/Hackensack and Lodi Railroad). The property is triangular in shape and the point of the triangle on the east side of the property narrows to a width of about five feet. The north side of the property borders on the right-of-way to the Hackensack and Lodi Railroad; a single-line spur and a siding are located on this right-of-way. The southern side borders on Coles Brook, which serves as a drainage pathway from Essex Street. The property is located behind a car wash and a Chinese Restaurant on Essex Street.

5.4.7.2 Logistical Concerns

The owner of 111 Essex Street, Mr. Scanel, currently uses the property as a staging area for his construction company. In conversations with the USACE, Mr. Scanel has indicated that his operations are flexible and that he can accommodate PDI activities. The lot is landlocked but there are ingress/egress easements on the Jax Carwash property directly to the south at 107B Essex Street. However, counsel for the Jax Car Wash owners have stated to the USACE that these easements are for Mr. Scanel's use only and that the government will need to acquire the use of these easements for their work. Access to the adjacent rail property will also be required and coordination with train schedules will need to be accomplished. According to Mr. Scanel, Stepan building demolition material was placed at this site during the 1950s and 1960s. There are no plans for development of the property.

5.4.7.3 Previous Investigations

Radiological:

Forty-three surface soil samples were collected. Several had concentrations of radionuclides of concern which exceeded the cleanup criteria established for the site. Sixteen sediment samples were collected from the Coles Brook along the southern property boundary. None of the sediment samples contained elevated concentrations of radionuclides of concern, and Coles Brook was therefore eliminated from consideration as a means of contaminant migration.

A total of 61 boreholes were installed and gamma logged throughout the triangular-shaped property. Subsurface soil samples were collected from five of the boreholes to compare laboratory soil sample results to downhole gamma radiation measurements. The central portion of the property contains contaminated residues to estimated depths that range from approximately 4.0-9.5 feet. Some of the contamination resides beyond the Scanel property boundary to the northwest on the Hackensack-Lodi Railroad property. See Appendix A for approximate locations of this material.

Geology:

Although split-spoon sampling was carried out at seven borehole locations for on-site chemical characterization, there is no record of boring logs having been completed at the site, and none were found in documents researched for this property.

Geotechnical:

At Property Cluster No. 7, no previous geotechnical investigations were performed.

Environmental:

Limited chemical characterization of the Scanel property was performed to determine whether hazardous waste is commingled with radioactive waste. Soil samples were collected on-site from seven boreholes by driving a split-spoon sampler in advance of the auger. Soil samples were composited to a depth of eight feet. Samples were analyzed for VOCs, SVOCs, PCBs, arsenic, barium, cadmium, chromium, lead, lithium, mercury, selenium, titanium, and total organic carbon. Results of the limited chemical characterization indicated the presence of priority pollutant SVOCs, including phenanthrene, chrysene, pyrene, fluoranthene, fluorene, acenaphthene, and naphthalene.

Geophysical:

Geophysical surveys were not performed at Property Cluster No. 7.

Hydrogeology:

There were no previous hydrogeologic studies performed at Property Cluster No. 7.

Civil/Survey:

The owner of 111 Essex Street, Mr. Scanel, has current surveys of his property, including sewer information. Civil/survey information on the Hackensack and Lodi Railroad has not been identified.

Underground Utilities:

Some utility information may be contained on survey maps for 111 Essex Street. This has yet to be verified. Detailed maps indicating utilities on the Hackensack and Lodi Railroad have not been identified.

5.4.7.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical and environmental surveys are shown in Figure 5-7.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information for 111 Essex Street will be evaluated to determine if it is adequate for design purposes. Existing civil/survey information for the Hackensack and Lodi Railroad will be acquired if available. If existing survey information is inadequate, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. A licensed surveyor will survey all as-built sample locations.

Underground Utilities:

Local utilities will be contacted to "mark-out" existing utilities prior to initiating the PDI investigations. A geophysical survey will be conducted at the property cluster (see above).

Radiological:

A surface walkover exposure rate scan will be conducted at the outset of the field investigation, followed by installation of four-inch diameter push-pipes. In-situ gamma spectroscopy will be performed following each push-pipe installation. Approximately 28 push-pipes, including one in a background location, will be installed to 10 feet below existing grade.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of 6 soil borings will be drilled at Property Cluster No. 7. All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or geotechnical engineer. In addition to sample description, the sample color, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs and in field logbooks.

Geotechnical:

Four geotechnical borings are planned in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

Two geotechnical borings are located along the Hackensack and Lodi Railroad, one on each side of the tracks. One geotechnical boring is located along the eastern property line adjacent to Coles Brook. The remaining geotechnical boring is located near the southern property line.

Environmental:

Two environmental soil borings are planned along the eastern side of the Hackensack and Lodi Railroad in areas of known radiological contamination. The depths of these borings will be determined in the field based upon the results of the radiological investigation. Samples will be collected from soil exhibiting maximum GM pancake detector count rates, or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.8 Property Cluster No. 8: 23 West Howcroft Avenue (DeSaussure)

5.4.8.1 Description of Property Cluster No. 8

Property Cluster No. 8 consists of one property: 23 West Howcroft Avenue (DeSaussure). The property contains a one-story-52,000 square foot building, a parking lot, and a wooded/grass area that contains a wetland area (0.4 acres), which has been identified as a PFO1 (Palustrine Broadleaved Deciduous area).

Previous radiological characterization of the property included the drilling of boreholes through the floor of the manufacturing area. Radiologically contaminated soil is known to be present beneath a portion of the building. To the west and north lies the

Sears property where Lodi Brook flows unconfined today and was most likely the source of contaminant deposition (M-575).

5.4.8.2 Logistical Concerns

A significant amount of sampling and ultimately excavation will occur in the wetland area located on the site. The wetland area will need to be fully delineated prior to beginning work in this area. The building consists of a front office area and a manufacturing area at the rear of the building. Four of the employees work in the front office and the remaining 22 work in manufacturing. All employees work five days per week, eight hours per day. The company is engaged in the manufacture and sale of furniture products, specifically tables. The manufacturing process includes cutting, covering, gluing, painting, and machining of all components of the tables. The front portion of the building is used for clerical and sales personnel and also contains a large lunchroom area that is accessed from the manufacturing area.

The building was expanded in 1972 with a 35-foot addition on the western side of the building. The company has plans to expand the northern portion of the building another 50 feet. The owner, Mr. DeSaussure, would like to complete the addition in the fall of 1999 in time for his busy season (winter months).

5.4.8.3 Previous Investigations

Radiological:

Previous radiological characterization found potential surface contamination along the north and west property boundaries, adjacent to the west side and a portion of the north side of the building. An isolated area near the east property boundary, and the area along the north property boundary extending westward from the east boundary to approximately 15 feet from the west boundary, were also identified as potentially contaminated areas.

Six surface soils were collected along the drainage ditch in the southwestern corner of the property. Subsurface soils collected on the property did not contain radionuclide concentrations which exceeded the residential cleanup criteria. However, downhole gamma logging data collected in 24 boreholes suggested contamination to depths of up to six feet.

A subsurface investigation was also performed beneath the building. Boreholes were only installed to depths of two feet due to concrete pads encountered at that depth. The soil in the two feet immediately beneath the building was not contaminated, although the potential for contamination beneath the concrete was noted.

Refer to Appendix A for further details regarding previous investigations.

Geology:

Detailed site-specific geologic information was not available for Property Cluster No. 8. However, it is known that the natural soil in the area of the wetlands located north of the building is buried under approximately 3.5 feet of bright blue silty fill material, identified as gypsum.

Geotechnical:

Site-specific geotechnical investigations were not performed at Property Cluster No. 8.

Environmental:

In 1994, seven soil boring samples were collected by CH2M Hill for chemical characterization. VOCs were detected in two samples of the blue material located in the northern end of the property; however, all VOCS were below the NJDEP direct contact and impact-to-groundwater soil-cleanup criteria. In the northern and eastern ends of the property, total PAHs exceeded 10,000 ppb. Semi-volatile PAHs were detected at concentrations above the NJDEP soil-cleanup criteria in one sample at the north end of the property. TCL pesticide compounds detected were not above the NJDEP soil-cleanup criteria. Metals were detected in all soil and blue material samples. Metals detected at concentrations exceeding the NJDEP residential direct and contact soil-cleanup criteria were arsenic, barium, beryllium, cadmium, lead, chromium, and antimony. The blue material was tested and found to be gypsum. Drum remains were found in two test pits excavated on-site.

Geophysical:

Two test pits excavated at 23 West Howcroft Avenue were found to contain crushed drums and drum remains. An estimated five drums were observed.

Hydrogeology:

The water table in the area of the wetlands lies eight to 12 inches below grade. Two groundwater monitoring wells exist in the northwest corner of the property (B38W12A and B38W12B), and groundwater was measured at 44.48 feet above mean sea level (MSL) in unconsolidated sediments and 44.66 feet above MSL, respectively. Locally, groundwater flow is to the southwest.

Civil/Survey:

Civil/survey information suitable for design has not been identified for Property Cluster No. 8.

Underground Utilities:

Detailed maps that show underground utilities have not been identified for Property Cluster No. 8.

5.4.8.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical and environmental surveys are shown in Figure 5-8.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, which may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If not available, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. A licensed surveyor will survey all as-built sample locations.

Underground Utilities:

Local utilities will be contacted to "mark-out" their utilities prior to PDI investigations. A geophysical survey of the property cluster will be conducted (see above).

Radiological:

Previous investigations identified both surface and subsurface contamination to depths of up to six feet.

A surface walkover exposure rate scan will, therefore, be conducted at the outset of the field investigation, followed by installation of four-inch diameter push-pipes. In-situ gamma spectroscopy will be performed following each push-pipe installation. A total of 26 push-pipes, including one in a background location, are proposed to be installed to 10 feet below existing grade.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of six geotechnical and three environmental soil borings will be drilled at Property Cluster No. 8. All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or a geotechnical engineer. In addition to describing the samples, the color of the sample, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process (e.g., blow counts) will be recorded on geologic boring logs and field logbook.

Geotechnical:

Six geotechnical borings are planned at Property Cluster No. 8 in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

If radiological contamination is encountered adjacent to structures and deeper than the foundation level, additional geotechnical laboratory testing and analyses may be required as part of the remediation work. Additional testing includes triaxial tests and consolidation tests on undisturbed tube samples of fine-grained (i.e., silt and/or clay) soils. Triaxial testing may be required to perform bearing capacity and/or slope stability analyses to determine safe excavation slopes adjacent to foundations. Consolidation tests may be needed to analyze and estimate potential settlements if dewatering is required for remediation.

One geotechnical boring is located near the northern property boundary adjacent to the Sears property in the wetlands/wooded area. Four borings are located around each side of the building perimeter where the proposed excavation coincides with the building footprint. The remaining boring is located in an area of known radiological contamination south of the building, adjacent to a drainage channel.

Environmental:

Three environmental soil borings are planned in areas of known radiological contamination. The depths of these borings will be determined in the field based upon the results of the radiological investigation. Samples will be collected from soil exhibiting maximum GM pancake detector count rates, or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

One boring is located at the north end of the property in the wetlands/wooded area. One environmental boring is located along the northern end of the building. The third boring is located near the northern property line.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.9 Property Cluster No. 9: 149-151 Maywood Avenue (Sears)

5.4.9.1 Description of Property Cluster No. 9

Property Cluster No. 9 consists of one property: 149-151 Maywood Avenue (the Sears Distribution Center, hereafter referred to as the Sears property). The property is approximately 27.4 acres in size. It is bounded by New Jersey Route 17 to the west; by Gulf and Sunoco Service Stations to the south; by the DeSaussure property and Maywood Avenue to the east; and by the MISS and the Stepan Company to the north.

A 6.5-acre warehouse covers much of the fenced Sears property. Approximately 11 acres of the site are paved, and the remaining areas contain grass. As indicated in the Stepan RI conducted by CH2M Hill, approximately 3 acres of wetlands are located east of the warehouse. The low-lying area between the Sears and Stepan properties along the rail spur is also classified as wetlands. This report indicated the presence of buried drums. Due to the presence of these buried drums, the PDI program presented below will be preceded by an investigation program which has been designed to identify locations and extent of buried drums. The approach completing the buried drum investigation program is presented in Appendix C of this Work Plan. It should also be noted that the

PDI program as presented below may need to be modified accordingly. Refer to Appendix A for a more detailed description of the Sears property.

5.4.9.2 Logistical Concerns

The Sears facility is active seven days a week and 24 hours a day, and there are no lag cycles in their operations. Sears uses 100 percent of the loading dock space (on all sides of the building except the north side), but only about one-third of the warehouse floor space. All deliveries to the region (stores and customers) originate from this facility. Approximately 50 trucks are loaded and leave the facility by 9:00 a.m. daily. Tractor-trailer trucks periodically deliver inventory to the warehouse throughout the day. However, the warehouse is relatively inactive between 9:00 a.m. and 3:00 p.m. The south corner of the facility is a pick-up point for customers who do not want delivery (9:00 a.m. to 5:00 p.m.). The west side of the facility is also used as a staging area for Sears' trucking contractor. The east side of the facility is a distribution facility for outlet stores in the area.

The loading dock has a concrete pad, and the parking lot appears to be asphalt only; however, Sears consultant (RCC) stated to the USACE that at other Sears facilities, asphalt is laid down over concrete. There are two inactive 10,000-gallon USTs southeast of the building, one diesel and one gasoline. In addition, there is an active 15,000-gallon UST located northeast of the warehouse.

Access to the warehouse is limited. Cars and small trucks leave by Maywood Avenue and trucks leave by Route 17. Sequencing work and closing loading dock space will have to be closely coordinated with Sears operations.

5.4.9.3 Previous Investigations

Radiological:

Surface exposure rates were elevated over a 940,000 square foot area (23 acres). Surface soil and sediment samples also had elevated concentrations of radionuclides. Subsurface soil samples were collected from six boreholes. ^{232}Thorium was the radionuclide of concern present at the highest concentrations. The majority of the contaminated material appears to reside within zero to three feet of the ground surface.

However, at some locations, gamma count rate data indicated contamination to depths of five to nine feet. See Appendix A for approximate locations of this material.

Geology:

The sediments underlying the Sears property are divided into two stratigraphic units: a bedrock unit composed of interbedded, well-cemented sandstone, and siltstone of Triassic/Jurassic age (Passaic Formation); and, an overlying section of unconsolidated clastic materials of Pliocene-Pleistocene age. These units are separated by an erosional unconformity. The surface of the bedrock unit was extensively eroded by both glacial and fluvial processes, and the unconsolidated sediments overlying the bedrock surface are composed of clastic materials deposited by these processes.

Geotechnical:

Geotechnical parameter data were collected from one soil boring from the Sears property (boring C24, 4-6 foot depth interval). Laboratory soil testing parameters included Atterberg limits (liquid and plastic), grain size distribution (wash sieve and hydrometer), and moisture content. In addition, total organic carbon (TOC) was determined in the sample.

Environmental:

In May 1987, Bechtel National, Inc. collected soil samples from 10 boreholes. Since the purpose of the investigation was to perform a limited chemical characterization, samples were composited to a maximum drill hole depth of 16 feet. Soil samples were analyzed for VOCs, SVOCs, priority pollutant metals, pesticides, PCBs, mercury, and RCRA hazardous waste characteristic parameters. Three soil samples exceeded NJDEP clean-up criteria for PAHs and nine soil samples exceeded NJDEP clean-up criteria for total non-PAHs. In addition, caffeine was detected at nine boring locations and d-limonene was detected at one sampling location. Arsenic, cadmium, chromium, lead, and lithium were also detected in soil samples above NJDEP soil cleanup criteria. In addition, lithium was detected in all soil samples

Twenty soil borings were drilled on the Sears property in April 1992 as part of a soil overburden investigation. Soil samples were analyzed for TCL/TAL cyanide, caffeine, a-pinene, d-limonene, and lithium. In addition, soil samples were collected from 12 test pits on the Sears property. Elevated concentrations of VOCs were detected in a cluster of test pits located in the asphalt/grassy area near the existing culvert.

Geophysical:

A borehole geophysical survey was conducted in several bedrock boreholes in May 1992 as part of the Remedial Investigation (RI) activities for the Stepan and vicinity properties (document M-575). Geophysical logs conducted during each borehole survey included natural gamma ray, spontaneous potential (SP), long normal (64-inch) and short normal (16-inch) resistivity (LSN), fluid resistivity, temperature, and three-arm caliper. The objectives of the geophysical surveys were to correlate geophysical log signatures to the lithologic data obtained from several bedrock cores, and to locate water-bearing fractures.

As part of the RI conducted by CH2M Hill for the Stepan and vicinity properties (including the Sears property), a surface geophysical investigation was performed from September 3, 1991 through March 17, 1992 (document M-575). The purpose of the survey was to identify potential chemical contamination sources. Specifically, the geophysical investigation was performed in an effort to locate and define ferromagnetic containers in the overburden soils. A magnetic survey was conducted; data were systematically collected at 10-foot intervals along north-south grid lines. The wetland area south of the building was surveyed at 20-foot intervals because the area was impassible without considerable brushing. In some locations, no data could be collected because perched water and marsh deposits were too deep. A total of 183 areas of buried metal have been identified at the site. These areas, based on magnetic anomalies, are not a result of known sources. The results and interpretation of the magnetic survey were used as a basis for a test pit program. The test pit program was conducted from March 26, 1992, through May 21, 1992. A total of 129 test pits were excavated on the Stepan property and 6 vicinity properties. Fourteen test pits on the Sears property were found to contain crushed drums or drum remains with no contents. An additional 16 test pits on

Sears were identified as containing drums with contents. Approximately 50 drums were observed in test pits at Sears.

Hydrogeology:

Site-specific hydrogeologic information was collected by CH2M Hill in 1993 (document M-575). Both the bedrock and the overlying unconsolidated material (overburden) are sources of groundwater for the Maywood area. The shallow groundwater flow system at the Sears property is in the unconsolidated sediments and the shallow Passaic Formation bedrock and occurs under unconfined, water table, and partially confined conditions. Groundwater in the overburden layer generally flows to the south and west. General flow directions in the bedrock are similar to the water table aquifer (i.e., groundwater flows south and west).

Civil/Survey:

As part of the RI conducted by CH2M Hill for the Stepan and vicinity properties, surveying work was performed by GEOD Corporation of Newfoundland, New Jersey. Surveying activities included establishing horizontal and vertical control networks at the site, including permanent benchmarks, and locating existing topographic features (such as building corners, fence lines, etc.) in New Jersey State Plane Coordinates. Sampling locations including surface water and sediment sample points, soil borings and monitoring wells were located horizontally and vertically. Also, eight distinct wetland areas were located horizontally.

Underground Utilities:

Detailed maps that depict underground utilities in the area have not been identified for Property Cluster No. 9.

5.4.9.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical and environmental surveys are shown in Figure 5-9. Note that these sampling locations will be modified based on an evaluation of the buried drum investigation program results outlined in Appendix C.

Geophysical:

A geophysical survey program has been outlined for the investigation of buried drums at the Sears property (see Section 5.5 and Appendix C). It is intended that this geophysical survey, which will be performed at the outset of PDI activities, will also identify the presence of underground utilities, storage tanks, or fuel lines that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. A licensed surveyor will survey all as-built sample locations.

Underground Utilities:

Local utilities will be contacted to "mark-out" existing utilities prior to initiating the PDI investigations. A geophysical survey will be conducted, if necessary, at the property cluster (see above).

Radiological:

Previous investigations identified surface and subsurface contamination and buried drums. The current activities, presence of buried drums, and the presence of wetlands may limit the total number of push-pipes to be installed, although it is desired to install a push-pipe every 50 feet on the x-y coordinates at a minimum to better delineate the contaminants. Where push-pipe installation in wetland areas is not possible, sediment samples may be collected for laboratory analysis of the radionuclides of concern.

Approximately 131 four-inch diameter push-pipes, including one background, are currently located at this property. An in-situ gamma spectroscopy survey will be performed within each push-pipe installed.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of 5 environmental and 17 geotechnical soil borings will be drilled at Property Cluster No. 9. All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or geotechnical engineer. In addition to sample description, the sample color, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs and in field logbooks.

Geotechnical:

A total of 17 geotechnical soil borings are planned at Property Cluster No. 9 in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

If radiological contamination is encountered adjacent to structures and deeper than the foundation level, additional geotechnical laboratory testing and analyses may be required as part of the remediation work. Additional testing includes triaxial tests and consolidation tests on undisturbed tube samples of fine-grained (i.e., silt and/or clay) soils. Triaxial testing may be required to perform bearing capacity and/or slope stability analyses to determine safe excavation slopes adjacent to foundations. Consolidation tests may be needed to analyze and estimate potential settlements if dewatering is required for remediation.

Six borings are located around the perimeter of the building. Four borings are evenly spaced along Route 17. Additionally, one boring is located along the eastern property line adjacent to Maywood Avenue. The remaining six borings are proposed throughout the site in areas of known radiological contamination.

Environmental:

A total of five environmental soil borings are planned in areas of known radiological contamination. The depths of these borings will be determined in the field based upon the results of the radiological investigation. Samples will be collected from soil exhibiting maximum GM pancake detector count rates, or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

Four borings are located east of the building, with two inside the fence line and two outside the fence line. One additional environmental borehole is located on the northwest side of the building.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.10 Property Cluster No. 10: 100 West Hunter Ave. (Stepan Company)

5.4.10.1 Description of Property No. 10

Property Cluster No. 10 consists of one property: The Stepan Chemical Company (Stepan), located at 100 W. Hunter Ave., which comprises approximately 18 acres. The site is located mainly in the Borough of Maywood, except for a small area in the southwest corner, which is in the Township of Rochelle Park. The DOE-owned MISS property borders the Stepan property to the west. To the north, and northeast, the property is bordered by a New York, Susquehanna, and Western Railroad line and several residential properties. To the east, there are several businesses that line West Hunter Avenue, and to the south the property is bordered by a Sears distribution center. Stepan's chemical processes include various extractions for natural flavorings used in soft drink products, as well as the manufacture of fatty acid esters for the cosmetic, personal care, and food industries.

5.4.10.2 Logistical Concerns

Stepan employs approximately 80 to 100 employees. Approximately 50 percent of the Stepan property is covered with structures or with the foundations of former structures, aboveground tank farms, and asphalt paving. The site consists of a series of man-made terraces on which the operating facility was constructed. The difference in elevation between the highest terrace (at the north side of the property) and the lowest terrace (at the south side) is approximately 25 feet. A chain-link fence encloses the property (excluding the main office and parking area). A railroad spur transects an undeveloped open area adjacent to the MISS, and continues across MISS. It is unknown whether this railroad spur is active.

PDI activities will need to be coordinated with Stepan management to ensure compliance with facility health and safety and standard operating procedures. Previous subsurface investigations were performed at Property No. 10; therefore, it is anticipated that this coordination will be completed without disturbance to current operations of this active facility. Specifically, sampling teams will adhere to any specific conditions as presented in the right-of-entry agreements (e.g., hours of operation, notification requirements, sensitive area where subsurface exploration may cause damage to existing utilities or loss of power during critical operating periods).

In addition, Stepan may conduct field audits and require split sample collection during the PDI, as part of the right-of-entry agreement.

5.4.10.3 Previous Investigations

***Radiological*:**

The 1992 RI Report for the Maywood Site, prepared by BNI, consisted of indoor and outdoor exposure rate data, and collection of surface and subsurface soil for thorium, radium and uranium analysis. Boreholes were installed and downhole gamma count rate data were collected.

Outdoor surface exposure rates were elevated (> 20 μR/h) in 27 of the 91 locations where measurements were performed, with a maximum of 228 μR/h. Surface soil samples were collected from 238 locations; contamination was detected in approximately 165 samples.

A total of 237 boreholes were installed; subsurface soil samples were collected and downhole gamma logging was performed in each borehole. Contamination was evident in approximately 105 boreholes. The RI confirmed that the primary sources of radioactive contamination are burial pit # 1 (maximum depth of radioactive contamination 13.5 feet, with approximate dimensions of 100 by 50 feet), burial pit # 2 (maximum depth of radioactive contamination 15.5 feet, with approximate dimensions of 200 by 100 feet), and burial pit # 3 (which consists of five trenches ranging up to 15 feet in depth). Burial pit contents include tailings and slurry pile material excavated from the Ballod Property (note: the burial pits were licensed by the NRC and are not being addressed under this FUSRAP project at this time). Radioactive contamination also is present in former thorium processing areas and where process residues were used as fill material in low lying areas.

Secondary areas of contamination are located in the northwestern corner of the property and along the southern property line, adjacent to the Sears Distribution Center property. The three most significant areas are in the south-central portion of the property.

In the scope of work prepared for the field demonstration project, the ACE estimated 45,082 cubic yards of contaminated material on the property. See Appendix A for approximate locations of these materials.

Geology:

The sediments underlying the Stepan property are divided into two stratigraphic units: a bedrock unit composed of interbedded, well-cemented sandstone and siltstone of Triassic/Jurassic age (Passaic Formation), and an overlying section of unconsolidated clastic materials of Pliocene-Pleistocene age. These units are separated by an erosional unconformity.

There is a bedrock high along the north-central area of the Stepan property (under the parking lot) along the New York, Susquehanna, and Western Railroad. In this region, bedrock is within six inches of the surface. This bedrock high extends to the east and southeast across the Myron property along Maywood Avenue. Two prominent highs extend south and west-southwest from this high point in the Stepan parking lot. The southwesterly oriented ridge connects across a saddle to the pronounced topographic ridge west of Lodi Brook. This saddle in the bedrock relief is expressed in the present surface topography and corresponds to a surface water divide.

In the lower portions of geologic borings drilled in the bedrock lows, sands and gravels derived from bedrock were encountered immediately above the weathered surface. The gravels were commonly composed of rounded to subrounded pebbles of Passaic Formation sandstone, indicating local fluvial transport and reworking. Gravel-sized fragments of igneous and metamorphic materials and boulder-sized erratics of sedimentary materials were observed in these deposits, indicating glacial transport into the local area.

Fill materials were encountered in many borings on the Stepan property, particularly at the waste burial sites. Fill materials varied from clays to coarse sands containing brick fragments, black and white mottled clay, concrete chips, wood chips, and other miscellaneous materials.

Geotechnical:

Although, extensive subsurface investigations were conducted at Property No. 10 during the RI activities, limited site-specific geotechnical data (i.e., laboratory tests such as grain size distribution, Atterberg Limits, water content, etc.) are available.

Environmental:

Ten soil borings were advanced on the Stepan property in February 1992 as part of a soil overburden investigation. Soil samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TAL metals and cyanide, and lithium. Of the TCL VOCs, benzene and xylene were detected at levels above the NJDEP soil cleanup criteria. PAHs at levels exceeding the NJDEP soil cleanup criteria were present at the 0-2.0 foot depth interval only. Caffeine was found at one location on Stepan. D-limonene, a-pinene, pesticides and PCBs were not detected in soil samples collected on Stepan. Arsenic, barium, cadmium, lead, selenium, and antimony were all found in soil samples at levels exceeding the NJDEP soil cleanup criteria.

Samples were collected from four test pits on the Stepan property. Test pit samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TAL metals and cyanide, and TCLP VOCs, SVOCs, herbicides, pesticides and metals. Acetone, benzene, toluene, and xylene were detected at low concentrations. Semivolatile PAHs were detected in a test pit located in the northwest corner of the property. The sample was collected from soils associated with a crushed drum, at a depth of 0.6 foot. Non-PAHs were detected at low concentrations. Results of previous investigations did not identify the soils at Property Cluster No. 10 as RCRA hazardous waste.

Geophysical:

CH2M Hill conducted borehole geophysical surveys in several bedrock boreholes in May 1992 as part of the RI activities for the Stepan and vicinity properties (see document M-575). Geophysical logs conducted during each borehole survey included natural gamma ray, spontaneous potential (SP), long normal (64-inch) and short normal (16-inch) resistivity (LSN), fluid resistivity, temperature, and three-arm caliper. The objectives of the geophysical surveys were to correlate geophysical log signatures to the lithologic data obtained from several bedrock cores, and to locate water-bearing fractures. The data were then used in conjunction with data obtained from hydraulic pressure injection (packer) testing to select screened intervals.

A surface geophysical investigation was performed from September 3, 1991 through March 17, 1992. The purpose of the survey was to identify potential chemical contamination sources. Specifically, the geophysical investigation was performed in an effort to locate and define ferromagnetic containers in the overburden soils. A magnetic survey was conducted; the results and interpretation of the magnetic survey were used as a basis for a test pit program. The test-pit program was conducted from March 26, 1992, through May 21, 1992. A total of 129 test pits were excavated on the Stepan property and 6 vicinity properties. Three of the test pits on the Stepan property each contained one drum with no contents.

Hydrogeology:

Both the bedrock and the overlying unconsolidated material (overburden) are sources of groundwater for the Maywood area. The shallow groundwater flow system at the Stepan property is in the unconsolidated sediments and the shallow Passaic Formation bedrock and occurs under unconfined, water table, and partially confined conditions. Water level elevations ranged from approximately 49 to 57 feet above MSL. Groundwater in the overburden layer generally flows to the south and west. Depth to groundwater is shallow and ranges from approximately 2 to 15 feet below ground surface. Seasonal fluctuations typically range from 1.5 to 6.0 feet during a year.

The potentiometric level of the semi-confined bedrock groundwater system ranged from 45 to 56 feet above MSL. General flow directions in the bedrock are similar to the water table aquifer (i.e., groundwater flows south and west).

Civil/Survey:

Survey work was performed by GEOD Corporation of Newfoundland, New Jersey as part of the RI conducted by CH2M Hill for the Stepan and vicinity properties. Survey activities included establishing horizontal and vertical control networks at the site, including permanent benchmarks, and locating existing topographic features (such as building corners, fence lines, etc.) in New Jersey State Plane Coordinates. Surface water and sediment samples, soil borings, and monitoring wells were located horizontally and vertically.

Underground Utilities:

Detailed maps showing underground utilities have not been identified for Property Cluster No. 10.

5.4.10.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical and environmental surveys are shown in Figure 5-10.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, storage tanks, or fuel lines that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. All sample locations will be surveyed by a licensed surveyor upon completion of the work.

Underground Utilities:

Prior to intrusive activities, a record search will be conducted, and local utility companies will be contacted to "mark-out" their on-site utility locations. A geophysical survey of the property will be conducted (see above).

Radiological:

Previous investigations identified surface and subsurface contamination in several areas of the Stepan property. A surface walkover exposure rate scan will be conducted at the outset of the field investigation. Installation of shallow boreholes and collection of gamma logging data will be conducted in areas which exhibit surface contamination in the absence of subsurface contamination. Prior to borehole installation, in situ gamma spectroscopy measurements will be taken of surface soil at each of the proposed borehole locations. One-inch diameter boreholes will be installed manually and gamma logging data will be collected at six-inch intervals. If count rates suggest the presence of radionuclides of concern at greater depths, four-inch diameter push-pipes will be installed, followed by collection of downhole in situ gamma spectroscopy data.

Push-pipe installation followed by collection of in-situ gamma spectroscopy data will be performed in areas which contain subsurface contamination. Most push-pipes will be installed to depths of 10 feet. However, if measurements suggest that contamination extends beyond 10 feet in depth, push-pipes will be advanced an additional 5 feet for a total depth of 15 feet.

The three burial pits will not be evaluated because they are not part of the scope of work established for the PDI. However, push-pipes/in-situ gamma spectroscopy will be performed around the perimeters of the building located on the south side of the property and adjacent to burial pit # 3 underlying the building.

A total of 79 push-pipes, including two background locations, and 27 shallow boreholes, including two background locations, will be installed at this property.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of 22 soil borings will be drilled at Property Cluster No. 10. These include 16 geotechnical borings and 6 environmental borings. All soils will be visually classified in the field in a manner consistent with the Unified Soil Classification System (USCS) (ASTM D 2488) by a geologist or geotechnical engineer, in accordance with USACE Borehole Logging Requirements. In addition to describing the samples, the sample color, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs with additional pertinent information to be recorded in the field logbook.

Geotechnical:

Sixteen geotechnical borings are planned at Property Cluster No. 10 in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

If radiological contamination is encountered adjacent to structures and deeper than the foundation level, additional geotechnical laboratory testing and analyses may be required as part of the remediation work. Additional testing includes triaxial tests and consolidation tests on undisturbed tube samples of fine-grained (i.e., silt and/or clay) soils. Triaxial testing may be required to perform bearing capacity and/or slope stability analyses to determine safe excavation slopes adjacent to foundations. Consolidation tests may be needed to analyze and estimate potential settlements if dewatering is required for remediation.

Six geotechnical borings are located along the southwestern property line adjacent to the rail siding. Three geotechnical borings are located in the northeast corner of the site, adjacent to buildings located near the NY Susquehanna & Western Railroad tracks and Property Cluster No. 11. Seven geotechnical borings are located adjacent to various buildings on the property.

Environmental:

Six environmental borings are planned for Property Cluster No. 10 in areas of known radiological contamination. The depths of these borings will be determined in the field based on radiological contamination encountered. Samples will be collected from soil exhibiting maximum GM pancake detector count rates, or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.11 Property Cluster No. 11: 205 Maywood Avenue (Myron Manufacturing), 50 West Hunter Avenue, and 61 West Hunter Avenue

5.4.11.1 Description of Property Cluster No. 11

Property Cluster No. 11 consists of three properties: 205 Maywood Avenue (Myron Manufacturing), 50 West Hunter Avenue, and 61 West Hunter Avenue. The 205 Maywood Avenue property houses the main Myron Manufacturing facility and offices. The parcel at 61 West Hunter Avenue is leased to several tenants, and the parcel at 50 West Hunter Avenue houses telemarketing personnel. Myron manufactures products such as calendars, appointment books, and personalized business supplies. Packaging and shipping activities are also conducted at their facility. Refer to Appendix A for a more detailed description of individual properties.

5.4.11.2 Logistical Concerns

Myron Manufacturing operates three shifts: Monday to Thursday from 7:00 a.m. to 5:30 p.m., Monday to Thursday from 7:00 p.m. to 5:30 a.m., and a Friday/Saturday/Sunday shift (hours unknown). The building was built in 1982. Summer is a slow period and the plant shuts down for the first two weeks in July. The emergency exits for the plant are in the rear of the building and will require coordination with Myron Manufacturing and the local Fire Department during PDI activities. As noted during conversations between Myron representatives and the USACE, a fiber optic cable is located between Myron buildings. In addition, gypsum-containing fill was encountered during building construction. Some "sink holes" have also been observed on the property. The majority of the outdoor area is covered with asphalt.

5.4.11.3 Previous Investigations

Radiological:

Previous investigations identified a small area of surface contamination at 61 West Hunter Avenue, and contamination to a depth of two feet adjacent to the northwest portion of the building at 205 Maywood Avenue. No contamination was found at 50 West Hunter Avenue. Refer to Appendix A for further details regarding previous investigations.

Geology:

Geological investigations were not performed at Property Cluster No. 11.

Geotechnical:

Geotechnical investigations were not performed at Property Cluster No. 11.

Environmental:

Environmental investigations were not performed at Property Cluster No. 11.

Geophysical:

Geophysical surveys were not performed at Property Cluster No. 11.

Hydrogeology:

Hydrogeologic studies were not performed at Property Cluster No. 11.

Civil/Survey:

Civil/survey mapping adequate for design purposes has not been identified for Property Cluster No. 11.

Underground Utilities:

Detailed maps that depict underground utilities in the area have not been identified for Property Cluster No. 11.

5.4.11.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical and environmental surveys are shown in Figure 5-11.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, storage tanks, or fuel lines that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. A licensed surveyor will survey all as-built sample locations.

Underground Utilities:

Local utilities will be contacted to "mark-out" existing utilities prior to initiating the PDI investigations. A geophysical survey will be conducted at the property cluster (see above).

Radiological:

Previous investigations indicated that radiological contamination is limited to the northwest portion of the building at 205 Maywood Ave. (i.e., property line between Stepan property and Myron property) and an area within the parking lot at 61 West Hunter Ave. A surface walkover exposure rate scan will be conducted within these two areas at the outset of the field investigation. A total of sixteen locations (including one background location) have been identified for installation of shallow boreholes and collection of gamma logging data at the 205 Maywood Avenue and 61 West Hunter Avenue properties. Prior to borehole installation, in-situ gamma spectroscopy measurements will be taken of surface soil at each of the proposed borehole locations. One-inch diameter boreholes will be installed manually and gamma logging data will be collected at six-inch intervals. If count rates suggest the presence of radionuclides of concern at greater depths, four-inch diameter push-pipes will be installed, followed by collection of downhole in-situ gamma spectroscopy data.

At 50 West Hunter Avenue, no previous contamination was found; therefore, there will be no intrusive radiological investigation at this property.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of six soil borings will be drilled at Property Cluster No. 11. All soils will be visually classified in the field in accordance with the Unified Soil Classification System (USCS) (ASTM D 2488) and USACE's standard procedures by a geologist or geotechnical engineer. In addition to sample description, the sample color, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs and in field logbooks.

Geotechnical:

Four geotechnical borings are planned at Property Cluster No. 11 in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

If radiological contamination is encountered adjacent to structures and deeper than the foundation level, additional geotechnical laboratory testing and analyses may be required as part of the remediation work. Additional testing includes triaxial tests and consolidation tests on undisturbed tube samples of fine-grained (i.e., silt and/or clay) soils. Triaxial testing may be required to perform bearing capacity and/or slope stability analyses to determine safe excavation slopes adjacent to foundations. Consolidation tests may be needed to analyze and estimate potential settlements if dewatering is required for remediation.

205 Maywood Avenue: At 205 Maywood Avenue, two geotechnical borings are proposed along the northwestern end of the building where previous data indicate radiological contamination.

50 West Hunter Avenue: No geotechnical borings are proposed for this property.

61 West Hunter Avenue: At 61 West Hunter Avenue, two borings are proposed west of the building in the asphalt parking lot along the southern property line.

Environmental:

A total of two environmental boreholes are planned along the west side of the 205 Maywood Avenue building and the southern property line of 61 West Hunter Avenue. The depths of these borings will be determined in the field based upon the results of the radiological investigation. Samples will be collected from soil exhibiting maximum GM pancake detector count rates, or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.

5.4.12 Property Cluster No. 12: 100 West Hunter Ave. (Maywood Interim Storage Site [MISS]): New York, Susquehanna & Western Railroad, and NJ Route 17

5.4.12.1 Description of Property Cluster No. 12

Property Cluster No. 12 includes three properties: 100 West Hunter Ave. (MISS), portions of the New York, Susquehanna & Western (NYS&W) Railroad, and a portion of NJ Route 17 abutting the Ballod property. The MISS, owned by the DOE, is located at 100 West Hunter Ave., and comprises 11.7 acres. The MISS was established in 1985 to provide an interim storage site for waste from DOE decontamination activities until a permanent disposal site was found. MISS contains two buildings (Building 76 and a pumphouse), temporary office trailers, and a water reservoir. The water reservoir and pumphouse are still in use by Stepan Company. The MISS is currently being used as a staging area for on-going remediation activities at vicinity residential properties. The NYS&W Railroad site is approximately 2,800 feet long by 100 feet wide. This portion of the railroad forms the northern boundary for the Ballod Associates Property, the MISS, and the Stepan Company property. This property cluster includes only the portion of the NYS&W Railroad located east of NJ Route 17 (i.e., above MISS and Stepan, but not above Ballod). The NJ State Route 17 site extends approximately 1,200 feet, starting at the intersection of the NYS&W railroad and Route 17 south, and ending at Grove Avenue. The property borders the entire western boundary of the MISS. Refer to Appendix A for a more detailed description of individual properties.

5.4.12.2 Logistical Concerns

Current USACE thinking is that all contaminated soils on the NJ Route 17 site are inaccessible. Thus, no boring locations have been proposed, and no other investigation activities are anticipated for this property, as part of this PDI.

According to notes from a meeting between representatives from the NYS&W railroad and the USACE, the NYS&W Railroad is amenable to sampling activities on its property. All investigation activities will be coordinated with the railroad's schedule. Special care must be taken to avoid damaging the rail spur.

The MISS is a federally-owned facility. It will be used as a staging area for PDI and other activities. Two railroad spurs traverse the central and southern portion of the site; one services the Stepan Company, and the other serves the Sears warehouse adjacent to Stepan. Any excavation activities adjacent to the railroad spurs must protect the spurs.

5.4.12.3 Previous Investigations

***Radiological*:**

The results of the RI performed by BNI in 1986 and 1992 indicated that the areal extent of contamination includes virtually the entire MISS property. The primary sources of contamination are former retention ponds and mounds of solid material. Three retention ponds were located along the northern and western perimeters of the property. No radiological data were available for the NYS&W railroad. A sub-surface investigation of the NJ Route 17 site found radiological contamination in several areas on both sides of the highway, which was constructed through two former retention ponds from the original Maywood Chemical Works. Refer to Appendix A for detailed results of previous radiological investigations.

Geology:

The sediments underlying Property Cluster No. 12 are divided into two stratigraphic units: a bedrock unit composed of interbedded, well-cemented sandstone and siltstone of Triassic/Jurassic age (Passaic Formation), and an overlying section of unconsolidated clastic materials of Pliocene-Pleistocene age. The top of weathered bedrock varies across Property Cluster No. 12. There is a bedrock low sloping toward the west under the far western and southwestern portions of MISS. The top of weathered bedrock ranges from approximately 2 feet to 20 feet below grade. The surface material at MISS is fill mixed with waste material from process operations at the former MCW. Refer to Appendix A for a more detailed geological description of individual properties.

Geotechnical:

Although extensive subsurface investigations were conducted at Property Cluster No. 12 during the RI activities, limited site-specific geotechnical data (i.e., laboratory tests such as grain size distribution, Atterberg Limits, water content, etc.) are available.

Environmental:

All of the environmental samples collected at Property Cluster No. 12 come from the MISS. Soils samples were collected in 1987 as part of a site characterization study and in 1992 during the Maywood RI. Samples were analyzed for VOCs, Metals, Rare Earth Elements, SVOCs, and Total Petroleum Hydrocarbons (TPH). In general, the contaminant category that most often exceeded state cleanup levels at MISS was metals. Metals detected at MISS include arsenic, cobalt, copper, lead, lithium, nickel, selenium, and vanadium. Most of the metals contamination occurs within a parcel that extends from an area east of Building 76 to an area west of the former storage pile (historically shown to be located within the northern portion of the MISS). Results of previous investigations did not identify the soils at Property Cluster No. 12 as RCRA hazardous waste. For additional details regarding previous environmental investigations refer to Appendix A.

Geophysical:

Geophysical surveys were not performed at Property Cluster No. 12.

Hydrogeology:

BNI installed monitoring wells at the MISS at various times from 1984 to 1991. Both the bedrock and the overlying unconsolidated material are sources of groundwater for the Maywood area. Depth to water is shallow and ranges from approximately 2 to 15 feet below ground surface. Seasonal fluctuations typically range from 1.5 to 6 feet during a year. Water levels are generally lowest from May through September, rise during late November and December, and peak in February and March. Average hydraulic gradients are generally low and indicate groundwater flow to the west and southwest toward the

Saddle River where groundwater is discharged. Refer to Appendix A for additional hydrogeological information.

Civil/Survey:

Civil/survey information suitable for design has not been identified for Property Cluster No. 12.

Underground Utilities:

Detailed maps that depict underground utilities in the area of Property Cluster No. 12 have not been identified.

5.4.12.4 Proposed Field Sampling Activities

Proposed sampling locations, depths, and analyses for radiological, geological, geotechnical and environmental surveys are shown in Figure 5-12.

Geophysical:

A geophysical survey will be performed prior to the beginning of field investigation work to identify the presence of underground utilities, storage tanks, or fuel lines that may impact intrusive activities.

Civil/Survey:

Existing civil/survey information will be acquired if available. If unavailable, a detailed property survey sufficient for design will be performed. The surveyor will establish a grid for sampling locations. All as-built sample locations will be surveyed by a licensed surveyor.

Underground Utilities:

Local utilities will be contacted to "mark-out" existing utilities prior to initiating the PDI investigations. A geophysical survey will be conducted at the property cluster (see above).

Radiological:

A surface walkover exposure rate scan will be conducted at the outset of the field investigation. Sixteen locations have been identified for installation of shallow boreholes and collection of gamma logging data. Prior to borehole installation, in situ gamma spectroscopy measurements will be taken of surface soil at each of the proposed borehole locations. One-inch diameter boreholes will be installed manually and gamma logging data will be collected at six-inch intervals. If count rates suggest the presence of radionuclides of concern at greater depths, four-inch diameter push-pipes will be installed, followed by collection of downhole in situ gamma spectroscopy data. Push-pipes will be installed in approximately 135 locations spread throughout the properties followed by collection of in-situ gamma spectroscopy data within each push-pipe.

Geological:

Assuming the same general extent of radiological contamination as indicated for previous investigations, a total of 25 soil borings will be drilled at Property Cluster No. 12. These include 17 geotechnical borings and 8 environmental borings. All soils will be visually classified in the field in a manner consistent with the Unified Soil Classification System (USCS) (ASTM D 2488), by a geologist or geotechnical engineer, in accordance with USACE Borehole Logging Requirements. In addition to describing the samples, the color of the sample, depositional type, PID readings, and any visual evidence of contamination will be noted. All information generated during the boring process will be recorded on geologic boring logs with additional pertinent information to be recorded in the field logbook.

Geotechnical:

Seventeen geotechnical borings are planned at Property Cluster No. 12 in areas of known radiological contamination. The final number and depths of these borings, as well as the number of samples collected for geotechnical analyses, will be determined in the field based on radiological contamination encountered. The anticipated maximum depths of radiological contamination, based on previous investigations, are presented in Table 3-1. Geotechnical lab analyses include grain-size distribution (including hydrometer), water content, Atterberg limits, and specific gravity. Geotechnical data from these borings will be used to characterize physical properties of soils for materials handling, slope stability, and dewatering.

If radiological contamination is encountered adjacent to structures and deeper than the foundation level, additional geotechnical laboratory testing and analyses may be required as part of the remediation work. Additional testing includes triaxial tests and consolidation tests on undisturbed tube samples of fine-grained (i.e., silt and/or clay) soils. Triaxial testing may be required to perform bearing capacity and/or slope stability analyses to determine safe excavation slopes adjacent to foundations. Consolidation tests may be needed to analyze and estimate potential settlements if dewatering is required for remediation.

MISS: Five geotechnical borings are located along the western property line adjacent to Route 17. Four geotechnical borings are located along the two diverging rail spurs traversing the middle of the site. The southernmost rail spur runs adjacent to a large reservoir tank. The proposed remediation will likely entail excavating around the majority, if not all, of the tank perimeter. Therefore, two geotechnical borings are located on the opposite sides of the tank.

The one building on MISS, Building 76, is located in a contaminated area in the eastern portion of the property. Therefore, two geotechnical borings are located around the perimeter of the building.

The three remaining geotechnical borings will be drilled to collect subsurface information to support the remediation work, as well as to collect additional samples for geotechnical laboratory analyses. These borings are located at the northern end of the site in areas of known radiological contamination.

NY, Susquehanna & Western Railroad: One geotechnical boring is located along the southern side of the railroad tracks in an area of known radiological contamination.

NJ Route 17: No geotechnical borings are planned at this property due to inaccessibility.

Environmental:

Eight environmental borings are planned for Property Cluster No. 12 in areas of known radiological contamination. The depths of these borings will be determined in the field based on radiological contamination encountered. Samples will be collected from soil exhibiting maximum GM pancake detector count rates, or showing signs of visual contamination or elevated PID readings. Additional samples will be collected if necessary.

One sample for full RCRA characteristics and TCL/TAL analysis (including chromium speciation) will be collected from each borehole. The primary purposes of this sampling are to assess the potential for the presence of commingled radiological and chemical contamination for transportation and disposal purposes. Appropriate quality assurance and quality control samples will be collected.

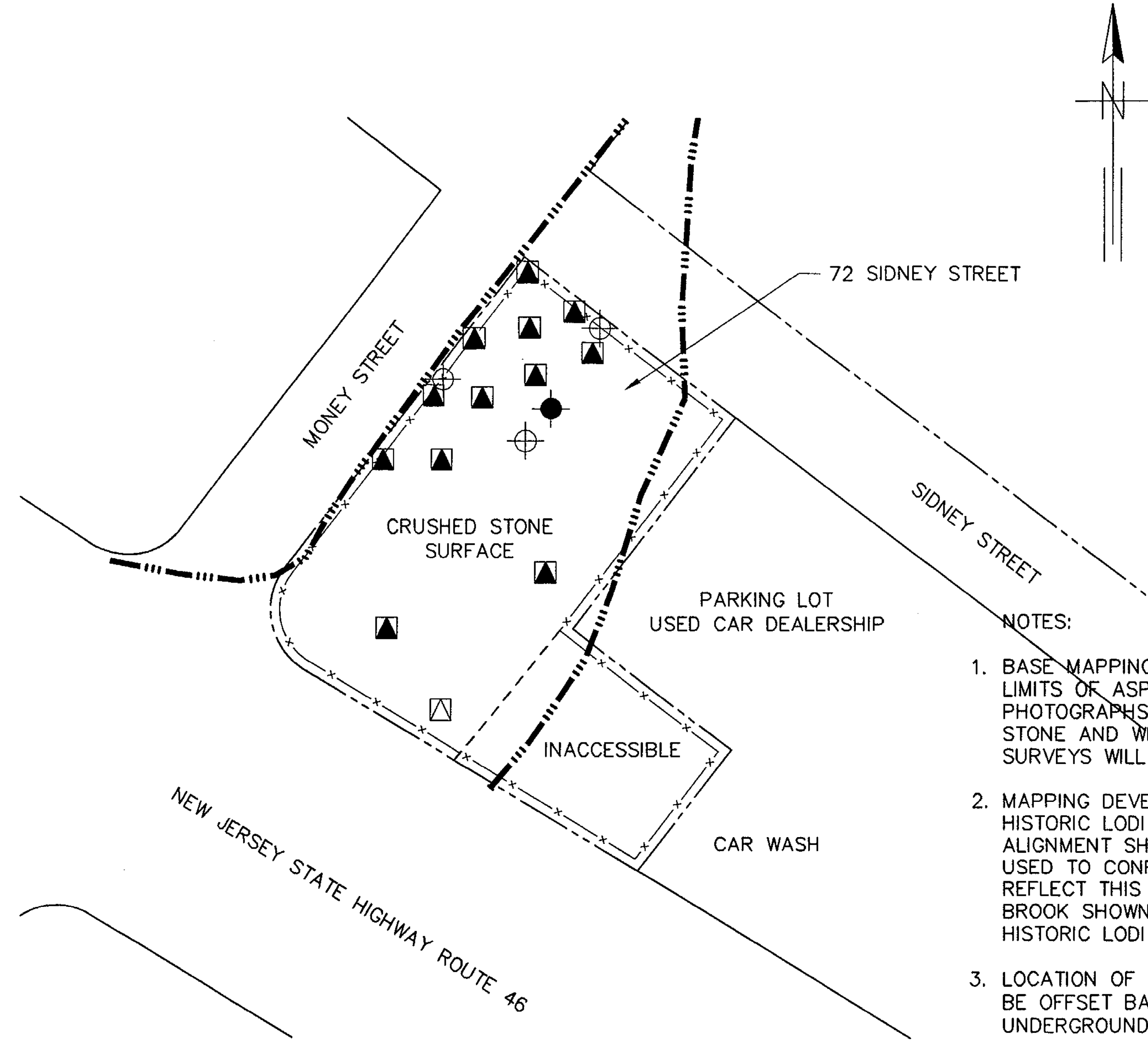
MISS: Eight soil borings are planned at the MISS. Proposed environmental borings are distributed throughout the MISS. Three borings are located in the vicinity of Building 76, where metals contamination was discovered during a previous investigation. The remaining five borings were placed in areas of known radiological contamination.

NYS&W Railroad: No environmental samples are proposed for this site.

NJ Route 17: No environmental samples are proposed for this site.

Hydrogeological:

Hydrogeological data needs are described in Section 4.4. In addition, seasonal data collected as part of the GWRIWP will be used to supplement existing data and data collected as part of this PDI. Depth to water will be recorded on drill log sheets during the PDI field work.



SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
▲	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	12
△	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	1
▼	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	0
▽	PROPOSED PUSH-PIPE BACKGROUND	0
⊕	PROPOSED GEOTECHNICAL BORING[3]	3
●	PROPOSED ENVIRONMENTAL BORING[4]	1

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1-5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE AND WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.

2. MAPPING DEVELOPED BY OTHERS INDICATES THAT THE LODI BROOK SHOWN ON THIS DRAWING IS THE HISTORIC LODI BROOK. THERE ARE CONFLICTING REFERENCES, HOWEVER, INDICATING THAT THE ALIGNMENT SHOWN MAY ACTUALLY BE THE CURRENT LODI BROOK. PDI SURVEY ACTIVITIES WILL BE USED TO CONFIRM THE LOCATION OF THE CURRENT LODI BROOK CHANNEL; FUTURE DRAWINGS WILL REFLECT THIS SURVEY INFORMATION. FIELD SAMPLE LOCATIONS PROPOSED ALONG THE HISTORIC LODI BROOK SHOWN ON THIS DRAWING MAY NEED TO BE RELOCATED SHOULD IT BE DETERMINED THAT THE HISTORIC LODI BROOK ALIGNMENT DIFFERS FROM THAT SHOWN.

3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.

4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

LEGEND

HISTORIC LODI BROOK CHANNEL

PROPERTY BOUNDARY

FENCE (APPROXIMATE LOCATION)

25 0 25 50

1"=50'

PROPERTY CLUSTER NO. 1: 72 SIDNEY STREET

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT

US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES

Prepared by: MALCOLM PIRNIE

Reviewed by: Date:

Drawn by: LGM Date: 6/99

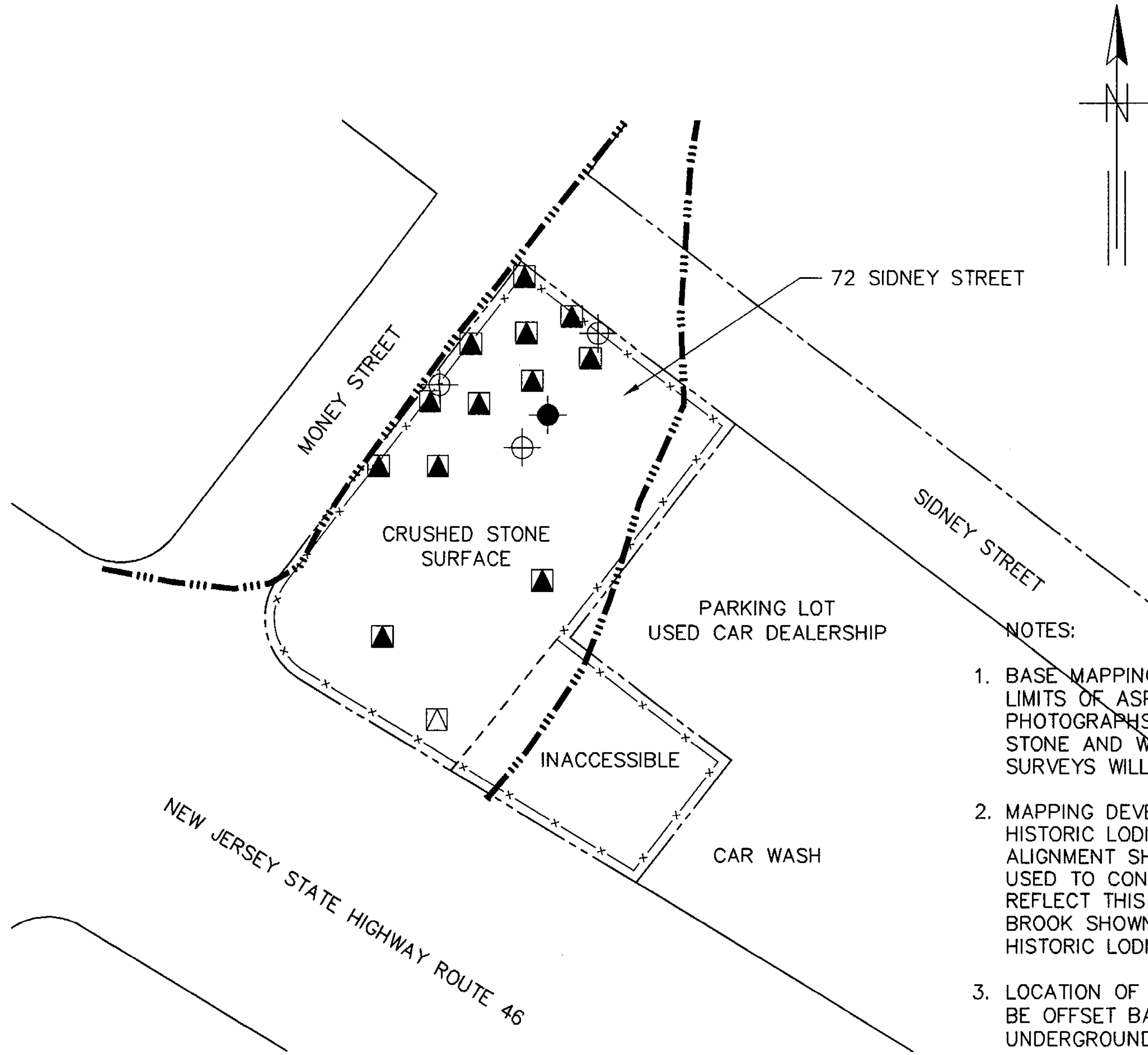
File Name: $MAY-C1.DWG

PROPERTY CLUSTER NO. 1
PROPOSED SAMPLING PROGRAM

PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND
ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-1

User: 7308 Job: 3674002000 File: I:\ACAD\PROJ\3674005O\$MAY-C1.DWG Scale: 1:1 Date: 10/05/1999 Time: 14:21



SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
▲	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	12
△	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	1
▼	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	0
▽	PROPOSED PUSH-PIPE BACKGROUND	0
⊕	PROPOSED GEOTECHNICAL BORING[3]	3
●	PROPOSED ENVIRONMENTAL BORING[4]	1

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1-5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE AND WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.

2. MAPPING DEVELOPED BY OTHERS INDICATES THAT THE LODI BROOK SHOWN ON THIS DRAWING IS THE HISTORIC LODI BROOK. THERE ARE CONFLICTING REFERENCES, HOWEVER, INDICATING THAT THE ALIGNMENT SHOWN MAY ACTUALLY BE THE CURRENT LODI BROOK. PDI SURVEY ACTIVITIES WILL BE USED TO CONFIRM THE LOCATION OF THE CURRENT LODI BROOK CHANNEL; FUTURE DRAWINGS WILL REFLECT THIS SURVEY INFORMATION. FIELD SAMPLE LOCATIONS PROPOSED ALONG THE HISTORIC LODI BROOK SHOWN ON THIS DRAWING MAY NEED TO BE RELOCATED SHOULD IT BE DETERMINED THAT THE HISTORIC LODI BROOK ALIGNMENT DIFFERS FROM THAT SHOWN.

3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.

4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

LEGEND

- HISTORIC LODI BROOK CHANNEL
- PROPERTY BOUNDARY
- FENCE (APPROXIMATE LOCATION)

25 0 25 50
1"=50'

PROPERTY CLUSTER NO. 1: 72 SIDNEY STREET

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT

US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES

Prepared by: MALCOLM PIRNIE

Reviewed by: Date:

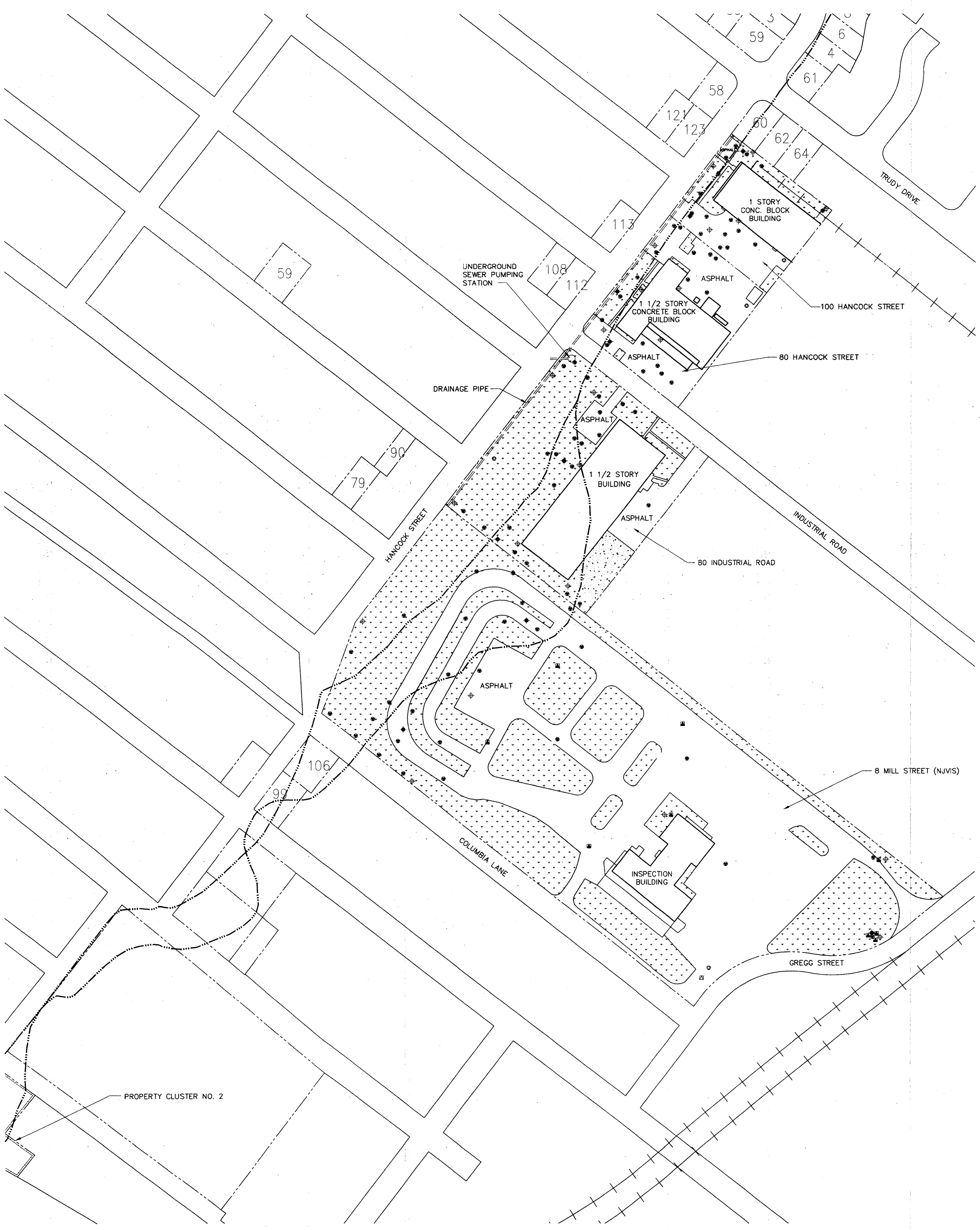
Drawn by: LGM Date: 6/99

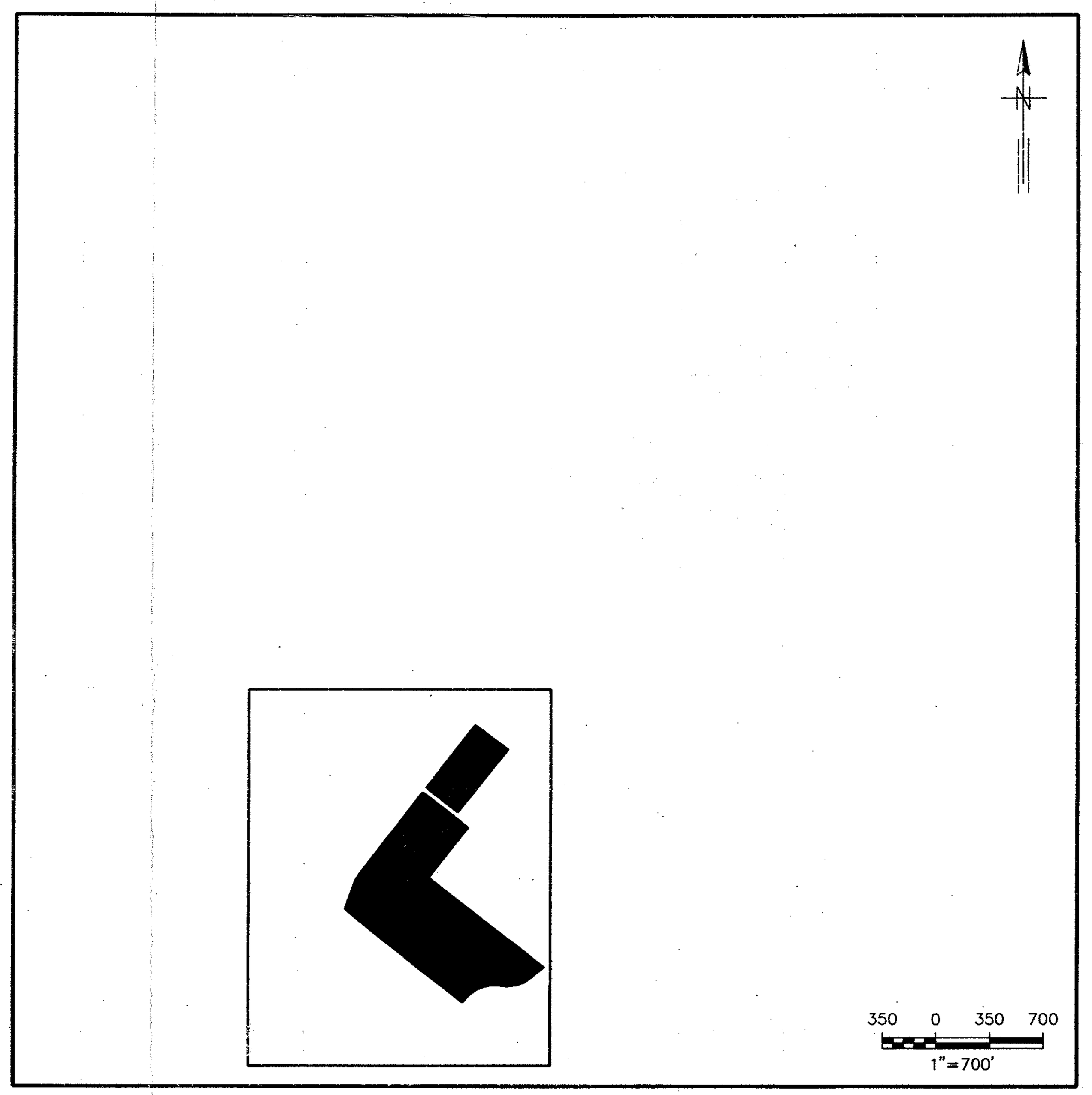
File Name: $MAY-C1.DWG

PROPERTY CLUSTER NO. 1
PROPOSED SAMPLING PROGRAM

PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-1





KEY MAP

LEGEND

HISTORIC LODI BROOK CHANNEL

BOUNDARY BETWEEN BOROUGHS

PROPERTY BOUNDARY

GRASS (APPROXIMATE)

GRAVEL (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	9
	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	1
	PROPOSED PUSH–PIPE (4" DIAMETER)[2]	82
	PROPOSED PUSH–PIPE BACKGROUND	4
	PROPOSED GEOTECHNICAL BORING[3]	22
	PROPOSED ENVIRONMENTAL BORING[4]	9

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1–5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

ESTIMATED NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY CLUSTER NUMBER	GEOTECHNICAL						CHEMICAL ANALYSES			RADIOLOGICAL ANALYSES
	SPECIFIC GRAVITY	ATTERBERG LIMITS	GRAIN SIZE	WATER CONTENT	TRIAXIAL TESTS (2)	CONSOLID TESTS (2)	CHROMIUM SPECIATION	TCL/TAL	RCRA CHAR.	SOIL SAMPLES (3)
2	TBD	TBD	TBD	TBD	TBD	TBD	9	9	9	10

(1) Sample Analyses Rationale:
a Chromium speciation – Speciation of trivalent and hexavalent chromium for health and safety purposes.
b TCL/TAL – Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
c RCRA Characteristics – To support transportation & disposal activities.
d Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, and Water Content) – To characterize physical properties of soil for excavation and remediation.

(2) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine–grained materials, where present. These parameters will be used to perform engineering analyses where excavations are adjacent to structures.

(3) Surface soil samples will be randomly collected from 10% of the gamma logging and push pipe locations for radiological analyses.

TBD = To be determined.

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE AND WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.

2. MAPPING DEVELOPED BY OTHERS INDICATES THAT THE LODI BROOK SHOWN ON THIS DRAWING IS THE HISTORIC LODI BROOK. THERE ARE CONFLICTING REFERENCES, HOWEVER, INDICATING THAT THE ALIGNMENT SHOWN MAY ACTUALLY BE THE CURRENT LODI BROOK. PDI SURVEY ACTIVITIES WILL BE USED TO CONFIRM THE LOCATION OF THE CURRENT LODI BROOK CHANNEL; FUTURE DRAWINGS WILL REFLECT THIS SURVEY INFORMATION. FIELD SAMPLE LOCATIONS PROPOSED ALONG THE HISTORIC LODI BROOK SHOWN ON THIS DRAWING MAY NEED TO BE RELOCATED SHOULD IT BE DETERMINED THAT THE HISTORIC LODI BROOK ALIGNMENT DIFFERS FROM THAT SHOWN.

3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.

4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

PROPERTY CLUSTER NO. 2: 100 HANCOCK STREET
80 HANCOCK STREET
80 INDUSTRIAL ROAD
NJ VEHICLE INSPECTION STATION

50 0 50 100
1"=100'

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT
US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

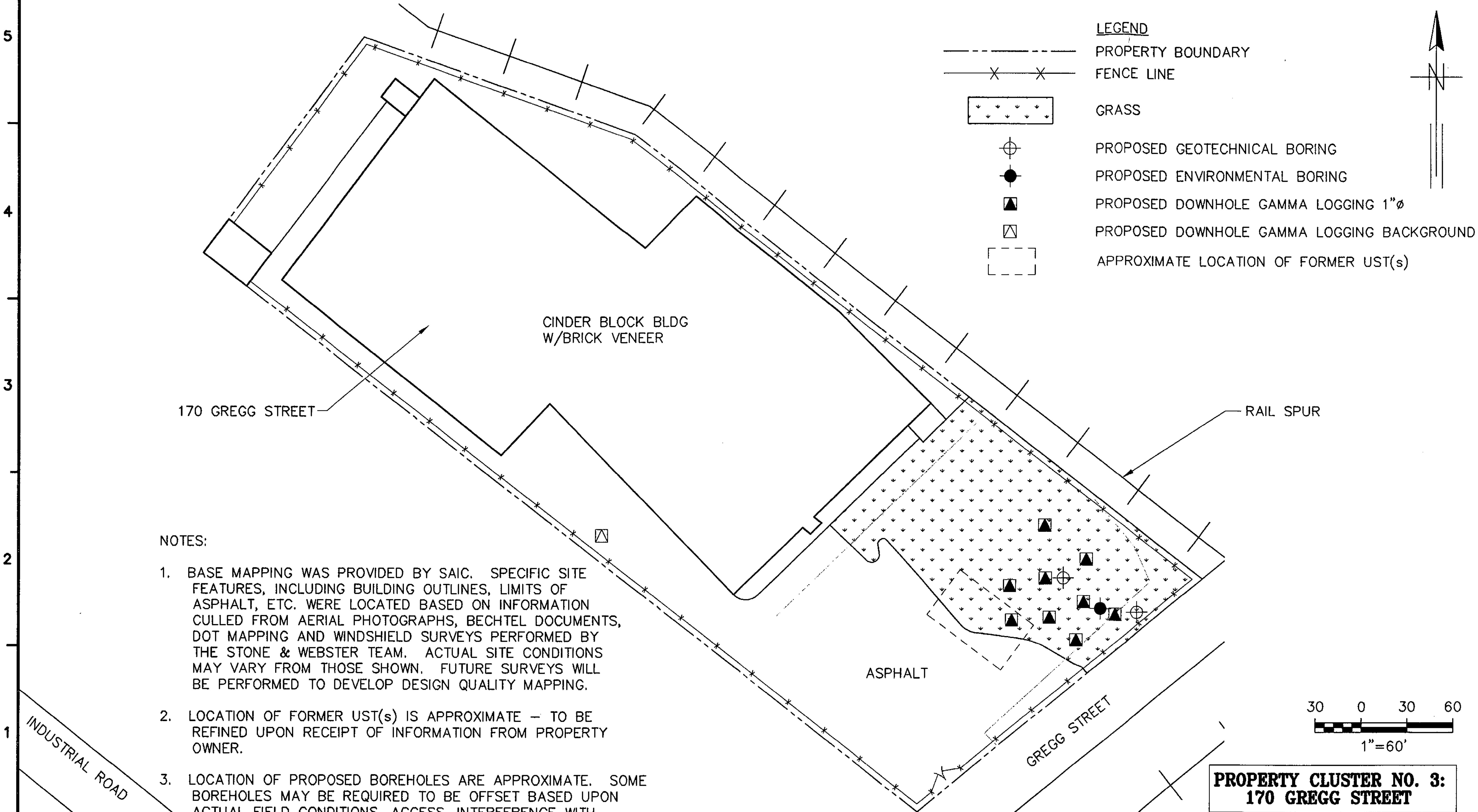
STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES

Prepared by: MALCOLM PIRNIE	Reviewed by:	Date:
Drawn by: LGM Date: 6/99	File Name: $MAY–C2.DWG	

PROPERTY CLUSTER NO. 2 PROPOSED SAMPLING PROGRAM

PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41–98–R–0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5–2



**PROPERTY CLUSTER NO. 3:
170 GREGG STREET**

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE & WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.

2. LOCATION OF FORMER UST(s) IS APPROXIMATE – TO BE REFINED UPON RECEIPT OF INFORMATION FROM PROPERTY OWNER.

3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.

4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/ /GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT
US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM

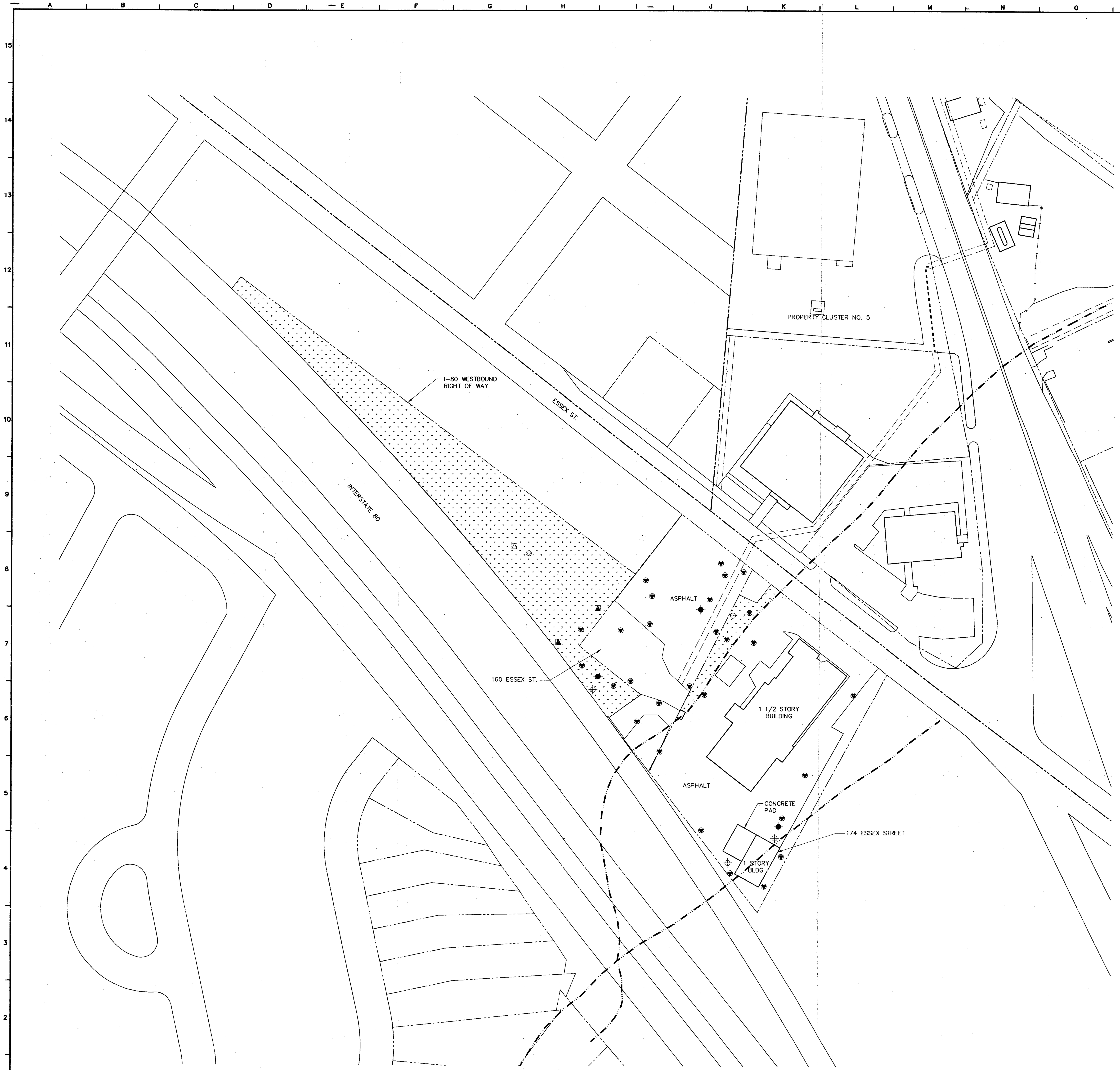
STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES

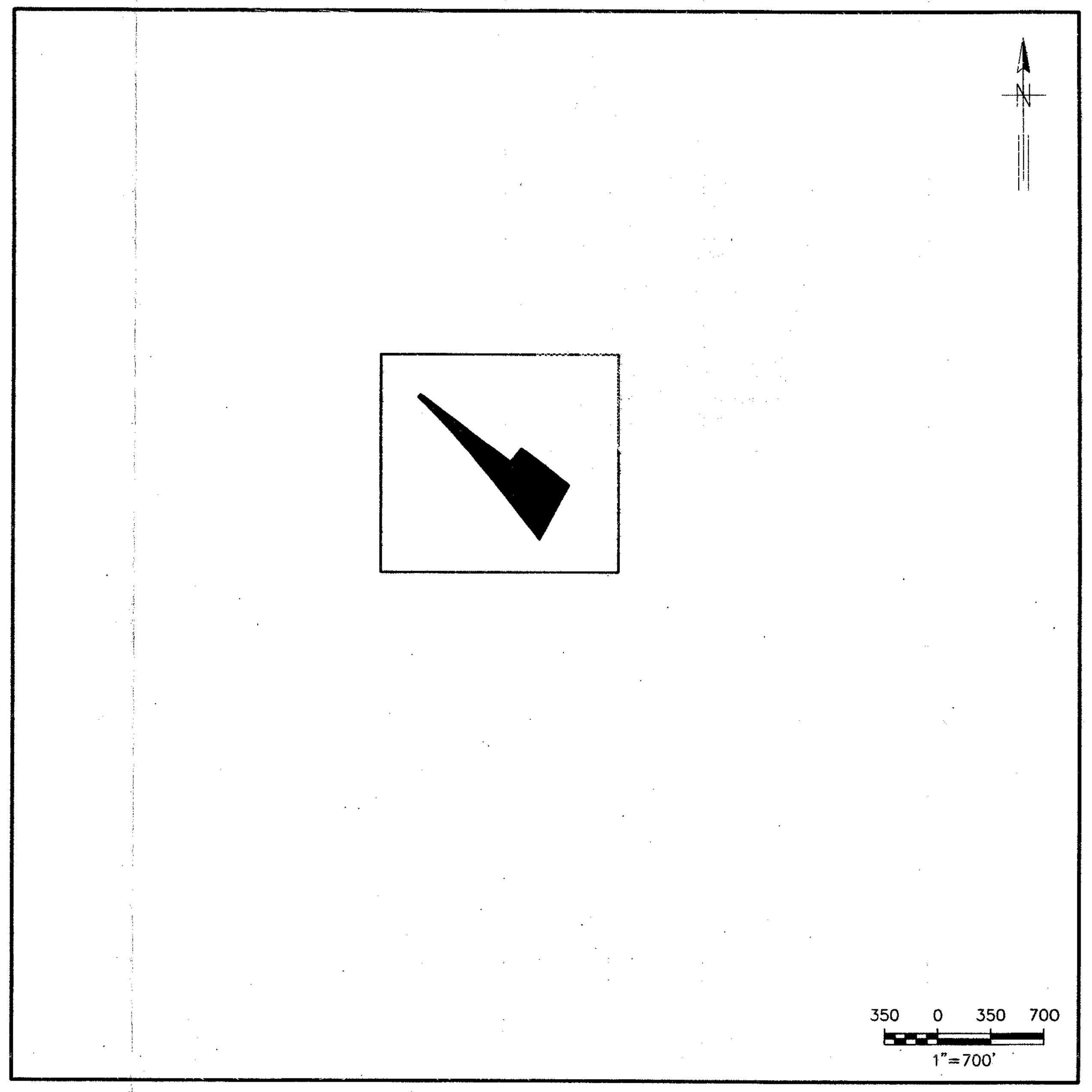
Prepared by: MALCOLM PIRNIE		Reviewed by:	Date:
Drawn by: LGM	Date: 6/99	File Name: $MAY-C3.DWG	

**PROPERTY CLUSTER NO. 3
PROPOSED SAMPLING PROGRAM**

PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND
ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-3





KEY MAP

LEGEND

- STREAM
- HISTORIC LODI BROOK CHANNEL
- BOUNDARY BETWEEN BOROUGHS
- PROPERTY BOUNDARY
- GRASS (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	2
	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	1
	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	28
	PROPOSED PUSH-PIPE BACKGROUND	1
	PROPOSED GEOTECHNICAL BORING[3]	4
	PROPOSED ENVIRONMENTAL BORING[4]	3

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1-5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

ESTIMATED NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY CLUSTER NUMBER	GEOTECHNICAL						CHEMICAL ANALYSES			RADIOLOGICAL ANALYSES
	SPECIFIC GRAVITY	ATTERBERG LIMITS	GRAIN SIZE	WATER CONTENT	TRIAXIAL TESTS (2)	CONSOLID TESTS (2)	CHROMIUM SPECIATION	TCL/TAL	RCRA CHAR.	SOIL SAMPLES (3)
4	TBD	TBD	TBD	TBD	TBD	TBD	3	3	3	3

(1) Sample Analyses Rationale:
a Chromium speciation - Speciation of trivalent and hexavalent chromium for health and safety purposes.
b TCL/TAL - Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
c RCRA Characteristics - To support transportation & disposal activities.
d Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, and Water Content) - To characterize physical properties of soil for excavation and remediation.
(2) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine-grained materials, where present. These parameters will be used to perform engineering analyses where excavations are adjacent to structures.
(3) Surface soil samples will be randomly collected from 10% of the gamma logging and push pipe locations for radiological analyses.
TBD = To be determined

NOTES:

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2. MAPPING DEVELOPED BY OTHERS INDICATES THAT THE LODI BROOK SHOWN ON THIS DRAWING IS THE HISTORIC LODI BROOK. THERE ARE CONFLICTING REFERENCES, HOWEVER, INDICATING THAT THE ALIGNMENT SHOWN MAY ACTUALLY BE THE CURRENT LODI BROOK. PDI SURVEY ACTIVITIES WILL BE USED TO CONFIRM THE LOCATION OF THE CURRENT LODI BROOK CHANNEL; FUTURE DRAWINGS WILL REFLECT THIS SURVEY INFORMATION. FIELD SAMPLE LOCATIONS PROPOSED ALONG THE HISTORIC LODI BROOK SHOWN ON THIS DRAWING MAY NEED TO BE RELOCATED SHOULD IT BE DETERMINED THAT THE HISTORIC LODI BROOK ALIGNMENT DIFFERS FROM THAT SHOWN.

3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.

4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

30 0 30 60
1"=60'

PROPERTY CLUSTER NO. 4: 160/174 ESSEX STREET
I-80 WEST RIGHT-OF-WAY

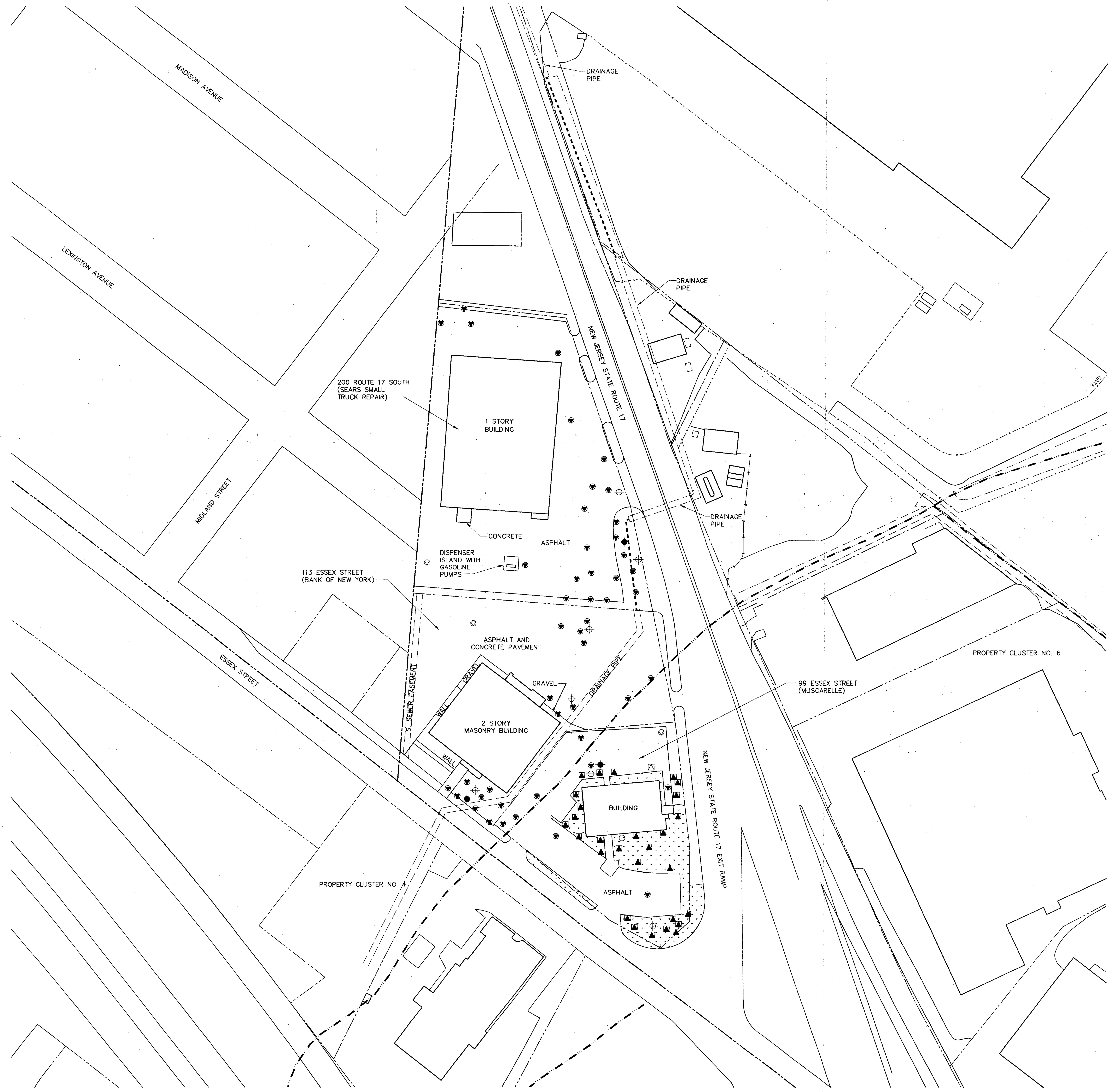
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT
US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM

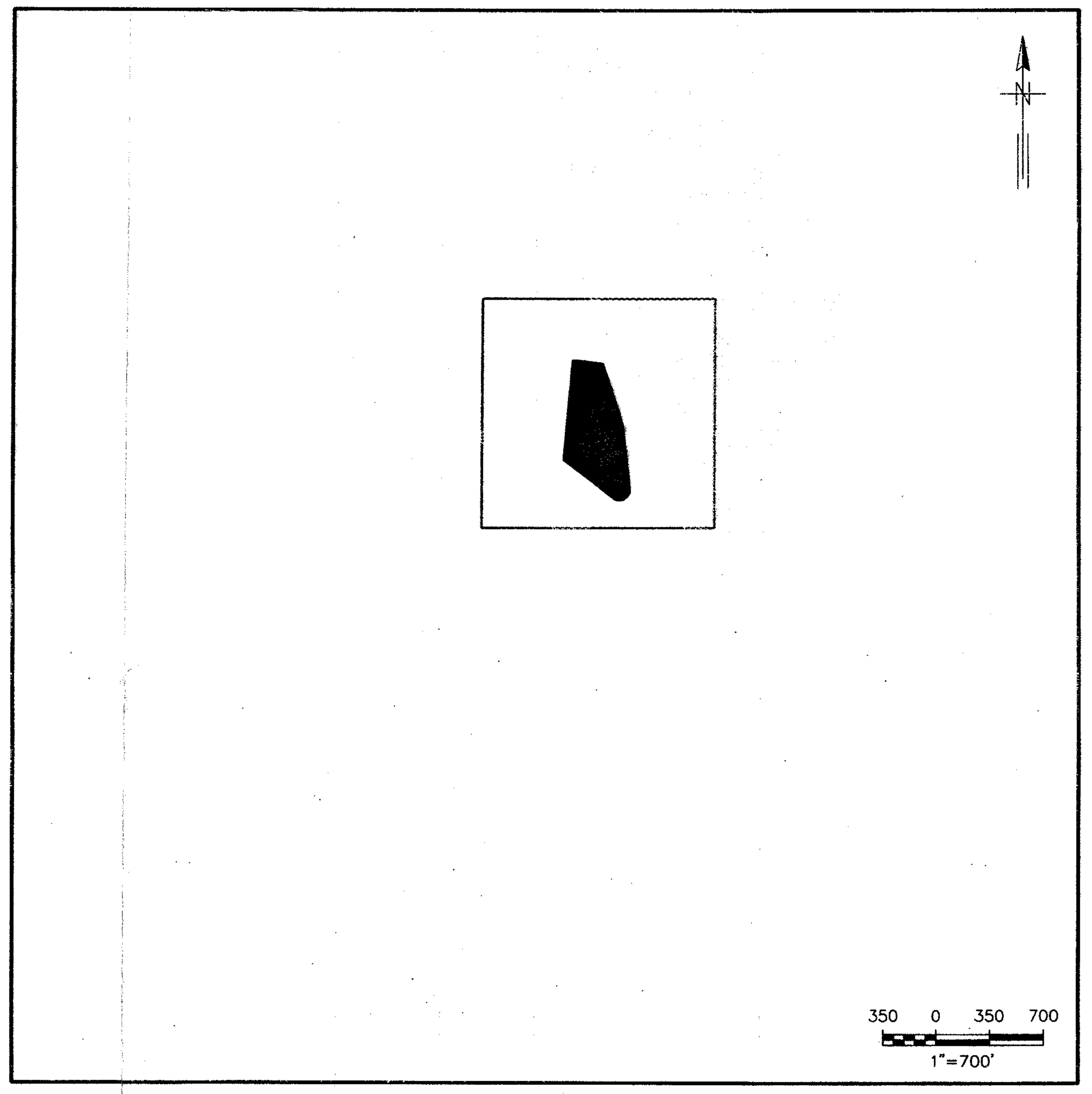
STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES
Prepared by: MALCOLM PIRNIE
Reviewed by: Date:
Drawn by: LGM Date: 6/99
File Name: $MAY-C4.DWG

PROPERTY CLUSTER NO. 4
PROPOSED SAMPLING PROGRAM
PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND
ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-4

User: 7308 Job: 3674002000 File: I:\ACAD\PROJ\36740050\$MAY-C4.DWG Scale: 1:1 Date: 10/05/1999 Time: 14:24





KEY MAP

LEGEND

- STREAM
- HISTORIC LODI BROOK CHANNEL
- BOUNDARY BETWEEN BOROUGHS
- PROPERTY BOUNDARY
- GRASS (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	28
	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	1
	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	47
	PROPOSED PUSH-PIPE BACKGROUND	3
	PROPOSED GEOTECHNICAL BORING[3]	8
	PROPOSED ENVIRONMENTAL BORING[4]	3

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1-5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY CLUSTER NUMBER	GEOTECHNICAL: SPECIFIC GRAVITY	GEOTECHNICAL: ATTERBERG LIMITS	GEOTECHNICAL: GRAIN SIZE	GEOTECHNICAL: WATER CONTENT	GEOTECHNICAL: TRIAXIAL TESTS (2)	GEOTECHNICAL: CONSOLID TESTS (2)	CHEMICAL ANALYSES: CHROMIUM SPECIATION	CHEMICAL ANALYSES: TCL/TAL	CHEMICAL ANALYSES: RCRA CHAR.	RADIOLOGICAL ANALYSES: SOIL SAMPLES (3)
5	TBD	TBD	TBD	TBD	TBD	TBD	3	3	3	8

(1) Sample Analyses Rationale:
a Chromium speciation – Speciation of trivalent and hexavalent chromium for health and safety purposes.
b TCL/TAL – Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
c RCRA Characteristics – To support transportation & disposal activities.
d Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, and Water Content) – To characterize physical properties of soil for excavation and remediation.

(2) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine-grained materials, where present. These parameters will be used to perform engineering analyses where excavations are adjacent to structures.

(3) Surface soil samples will be randomly collected from 10% of the gamma logging and push pipe locations for radiological analyses.

TBD = To be determined.

NOTES:

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2. MAPPING DEVELOPED BY OTHERS INDICATES THAT THE LODI BROOK SHOWN ON THIS DRAWING IS THE HISTORIC LODI BROOK. THERE ARE CONFLICTING REFERENCES, HOWEVER, INDICATING THAT THE ALIGNMENT SHOWN MAY ACTUALLY BE THE CURRENT LODI BROOK. PDI SURVEY ACTIVITIES WILL BE USED TO CONFIRM THE LOCATION OF THE CURRENT LODI BROOK CHANNEL; FUTURE DRAWINGS WILL REFLECT THIS SURVEY INFORMATION. FIELD SAMPLE LOCATIONS PROPOSED ALONG THE HISTORIC LODI BROOK SHOWN ON THIS DRAWING MAY NEED TO BE RELOCATED SHOULD IT BE DETERMINED THAT THE HISTORIC LODI BROOK ALIGNMENT DIFFERS FROM THAT SHOWN.

3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.

PROPERTY CLUSTER NO. 5: 99 ESSEX STREET
113 ESSEX STREET
200 ROUTE 17S

30 0 30 60
1"=60'

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT

US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES

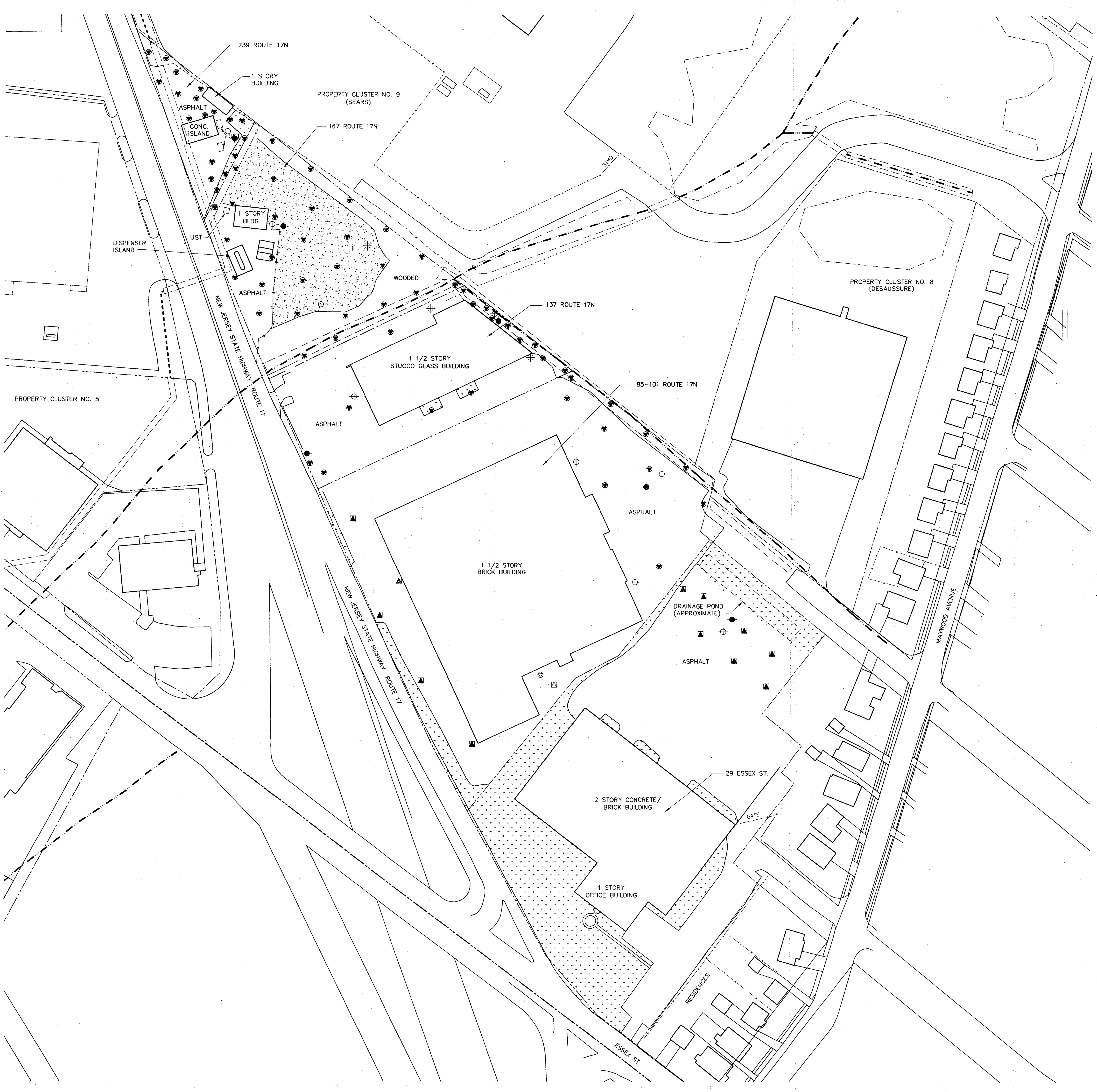
Prepared by: MALCOLM PIRNIE
Reviewed by: Date:
Drawn by: LGM Date: 6/99
File Name: $MAY-C5.DWG

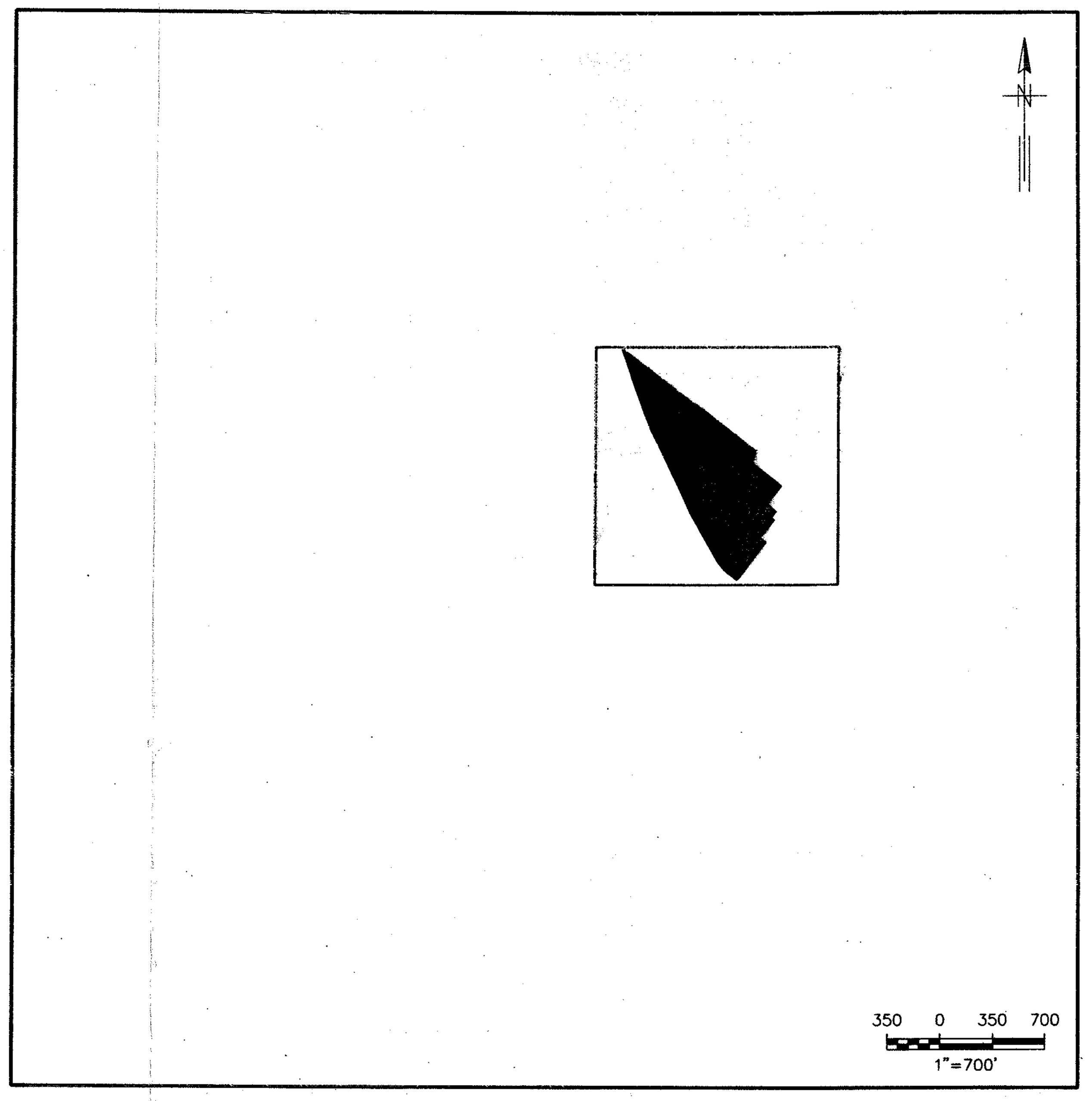
PROPERTY CLUSTER NO. 5 PROPOSED SAMPLING PROGRAM

PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-5

User: 7308 Job: 3674002000 File: \ACAD\PROJ\3674000\$MAY-C5.DWG Scale: 1:1 Date: 10/05/1999 Time: 14:25





KEY MAP

LEGEND

HISTORIC LODI BROOK CHANNEL
BOUNDARY BETWEEN BOROUGHS
PROPERTY BOUNDARY
STREAM
TOWN BOUNDARY
FENCE LINE
GRASS (APPROXIMATE)
GRAVEL (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
▲	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	12
△	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	1
▼	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	70
▽	PROPOSED PUSH-PIPE BACKGROUND	2
⊕	PROPOSED GEOTECHNICAL BORING[3]	12
●	PROPOSED ENVIRONMENTAL BORING[4]	6

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1-5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

ESTIMATED NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY CLUSTER NUMBER	GEOTECHNICAL						CHEMICAL ANALYSES			RADIOLOGICAL ANALYSES
	SPECIFIC GRAVITY	ATTERBERG LIMITS	GRAIN SIZE	WATER CONTENT	TRIAXIAL TESTS (2)	CONSOLID TESTS (2)	CHROMIUM SPECIATION	TCL/TAL	RCRA CHAR.	SOIL SAMPLES (3)
6	TBD	TBD	TBD	TBD	TBD	TBD	6	6	6	8

(1) Sample Analyses Rationale:
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TBD = To be determined.

NOTES:

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2. MAPPING DEVELOPED BY OTHERS INDICATES THAT THE LODI BROOK SHOWN ON THIS DRAWING IS THE HISTORIC LODI BROOK. THERE ARE CONFLICTING REFERENCES, HOWEVER, INDICATING THAT THE ALIGNMENT SHOWN MAY ACTUALLY BE THE CURRENT LODI BROOK. PDI SURVEY ACTIVITIES WILL BE USED TO CONFIRM THE LOCATION OF THE CURRENT LODI BROOK CHANNEL; FUTURE DRAWINGS WILL REFLECT THIS SURVEY INFORMATION. FIELD SAMPLE LOCATIONS PROPOSED ALONG THE HISTORIC LODI BROOK SHOWN ON THIS DRAWING MAY NEED TO BE RELOCATED SHOULD IT BE DETERMINED THAT THE HISTORIC LODI BROOK ALIGNMENT DIFFERS FROM THAT SHOWN.
3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.
4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.
5. UST LOCATIONS ARE APPROXIMATE, STATUS OF USTs IS UNKOWN.

PROPERTY CLUSTER NO. 6: 29 ESSEX STREET
85-101 ROUTE 17 NORTH
137 ROUTE 17 NORTH
167 ROUTE 17 NORTH
239 ROUTE 17 NORTH

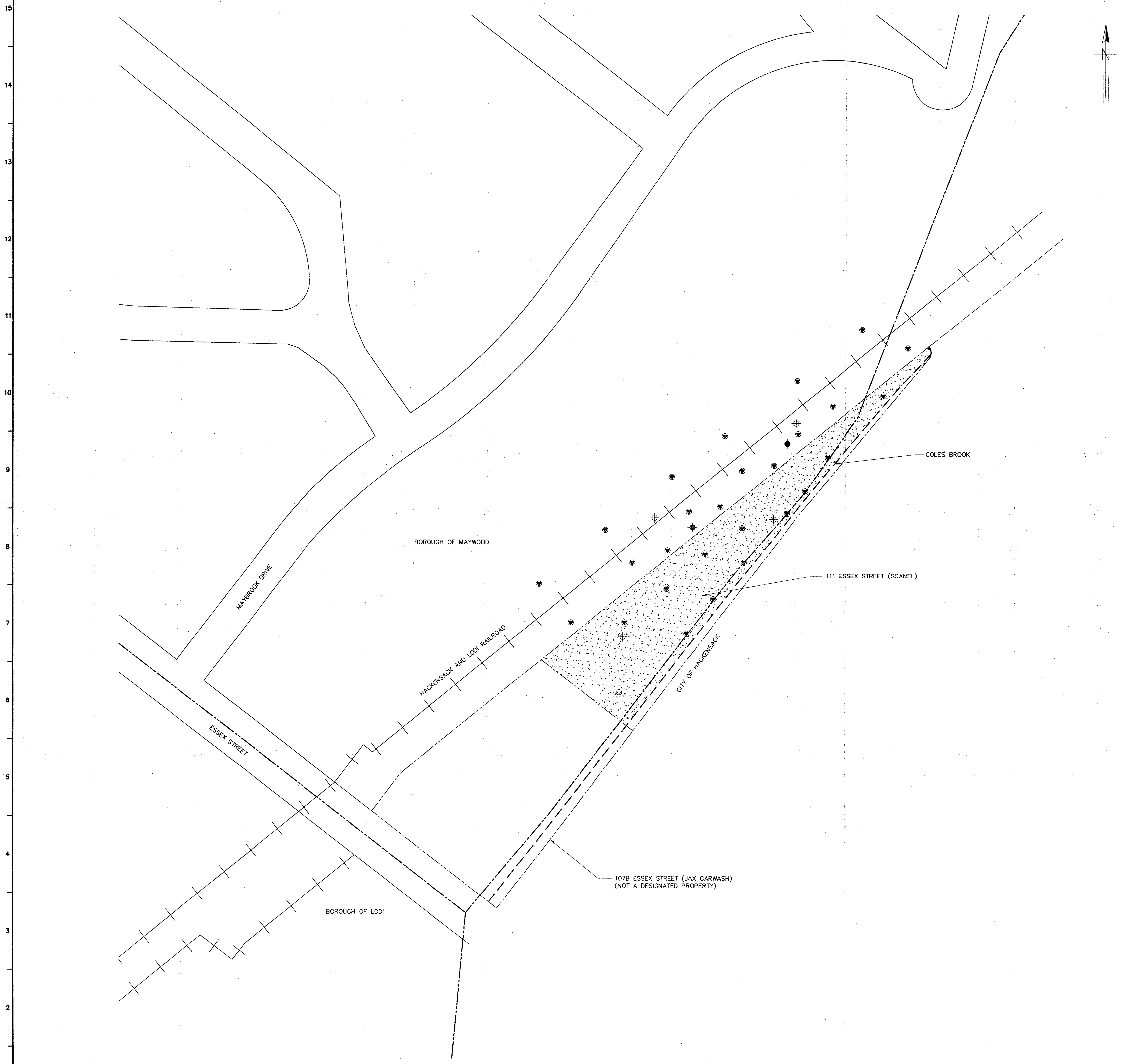
30 0 30 60
1"=60'

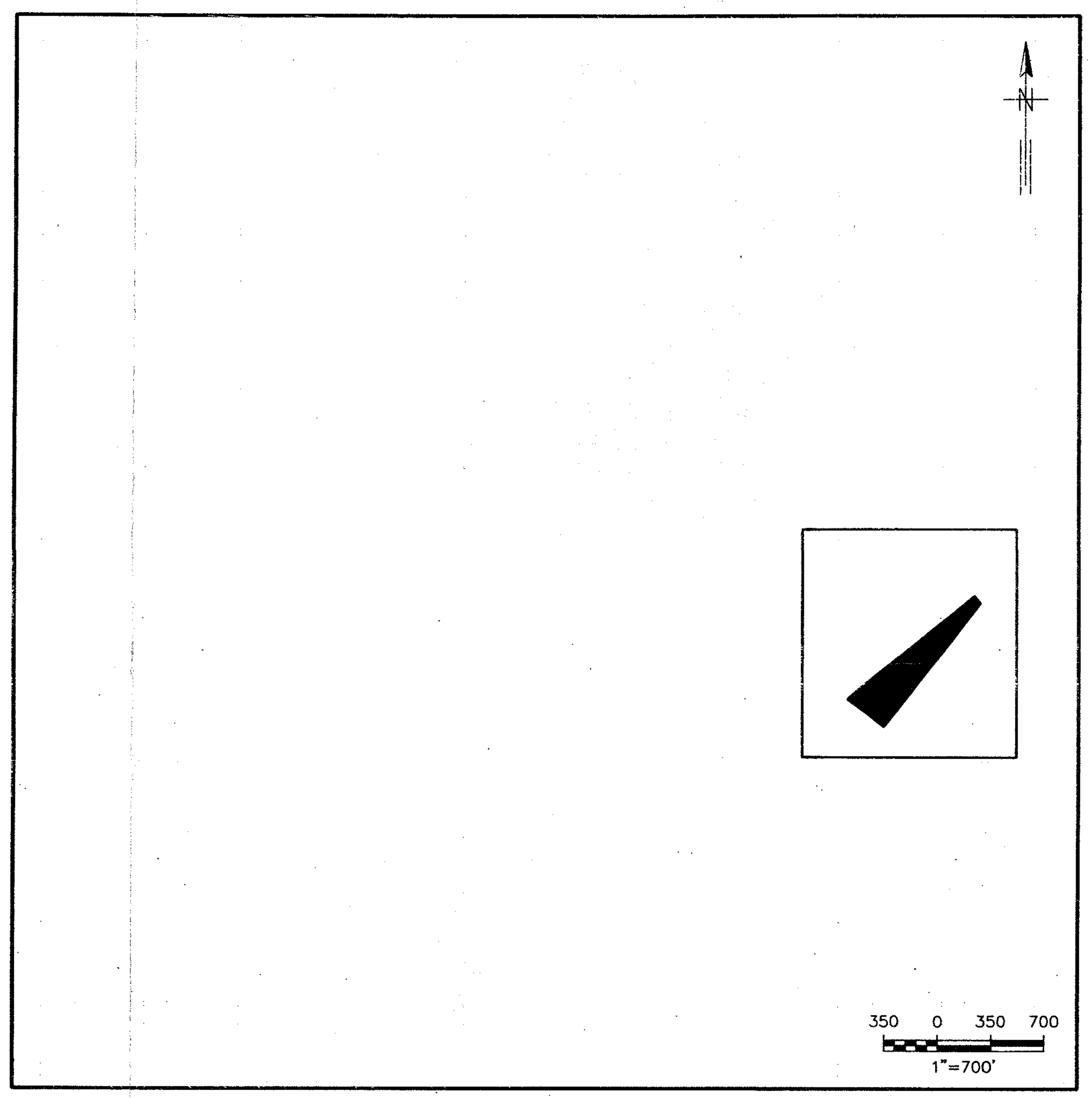
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT
US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES
Prepared by: MALCOLM PIRNIE
Reviewed by: Date:
Drawn by: LGM Date: 6/99
File Name: $MAY-C6.DWG

PROPERTY CLUSTER NO. 6 PROPOSED SAMPLING PROGRAM
PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-6





KEY MAP

LEGEND

COLES BROOK
BOUNDARY BETWEEN BOROUGHS
PROPERTY BOUNDARY
GRAVEL (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	0
	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	0
	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	27
	PROPOSED PUSH-PIPE BACKGROUND	1
	PROPOSED GEOTECHNICAL BORING[3]	4
	PROPOSED ENVIRONMENTAL BORING[4]	2

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1-5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

ESTIMATED NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY	GEOTECHNICAL						CHEMICAL ANALYSES			RADIOLOGICAL ANALYSES
CLUSTER NUMBER	SPECIFIC GRAVITY	ATTERBERG LIMITS	GRAIN SIZE	WATER CONTENT	TRIAXIAL TESTS (2)	CONSOLID TESTS (2)	CHROMIUM SPECIATION	TCL/TAL	RCRA CHAR.	SOIL SAMPLES (3)
7	TBD	TBD	TBD	TBD	TBD	TBD	2	2	2	3

(1) Sample Analyses Rationale:
a Chromium speciation - Speciation of trivalent and hexavalent chromium for health and safety purposes.
b TCL/TAL - Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
c RCRA Characteristics - To support transportation & disposal activities.
d Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, and Water Content) - To characterize physical properties of soil for excavation and remediation.
(2) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine-grained materials, where present. These parameters will be used to perform engineering analyses where excavations are adjacent to structures.
(3) Surface soil samples will be randomly collected from 10% of the gamma logging and push pipe locations for radiological analyses.
TBD = To be determined.

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE AND WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.
2. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.
3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.
4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

30 0 30 60
1"=60'

PROPERTY CLUSTER NO. 7: 111 ESSEX STREET

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT
US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

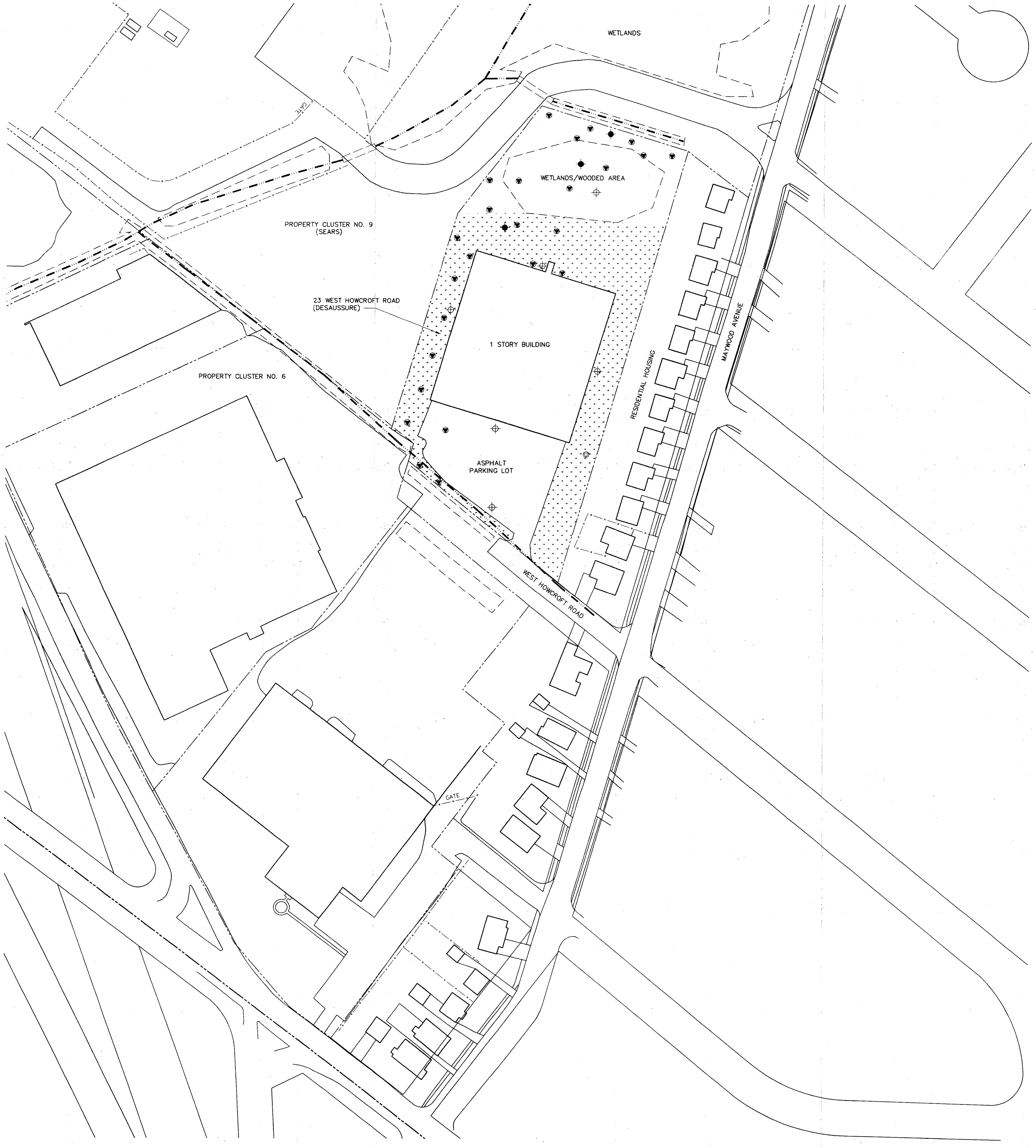
STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES

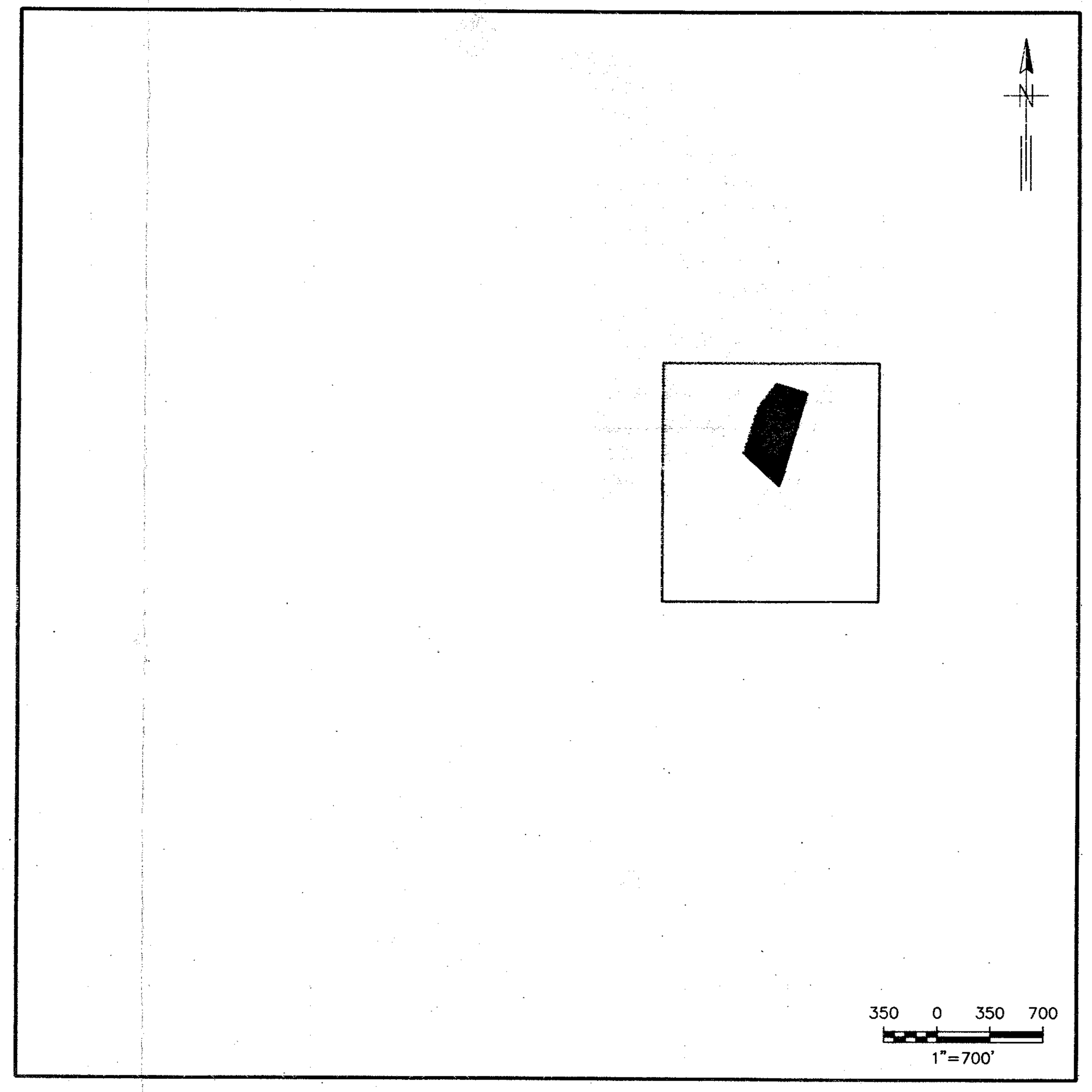
Prepared by: MALCOLM PIRNIE
Reviewed by: Date:
Drawn by: LGM Date: 6/99
File Name: $MAY-C7.DWG

PROPERTY CLUSTER NO. 7 PROPOSED SAMPLING PROGRAM

PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND
ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-7





KEY MAP

LEGEND

HISTORIC LODI BROOK CHANNEL
BOUNDARY BETWEEN BOROUGHS OF MAYWOOD AND LODI
PROPERTY BOUNDARY
APPROXIMATE WETLAND DELINEATION
GRASS (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	0
	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	0
	PROPOSED PUSH–PIPE (4" DIAMETER)[2]	25
	PROPOSED PUSH–PIPE BACKGROUND	1
	PROPOSED GEOTECHNICAL BORING[3]	6
	PROPOSED ENVIRONMENTAL BORING[4]	3

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1–5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

ESTIMATED NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY CLUSTER NUMBER	GEOTECHNICAL						CHEMICAL ANALYSES			RADIOLOGICAL ANALYSES
	SPECIFIC GRAVITY	ATTERBERG LIMITS	GRAIN SIZE	WATER CONTENT	TRIAXIAL TESTS (2)	CONSOLID TESTS (2)	CHROMIUM SPECIATION	TCL/TAL	RCRA CHAR.	SOIL SAMPLES (3)
8	TBD	TBD	TBD	TBD	TBD	TBD	3	3	3	3

(1) Sample Analyses Rationale:
a Chromium speciation – Speciation of trivalent and hexavalent chromium for health and safety purposes.
b TCL/TAL – Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
c RCRA Characteristics – To support transportation & disposal activities.
d Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, and Water Content) – To characterize physical properties of soil for excavation and remediation.
(2) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine–grained materials, where present. These parameters will be used to perform engineering analyses where excavations are adjacent to structures.
(3) Surface soil samples will be randomly collected from 10% of the gamma logging and push pipe locations for radiological analyses.
TBD = To be determined.

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE AND WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.
2. MAPPING DEVELOPED BY OTHERS INDICATES THAT THE LODI BROOK SHOWN ON THIS DRAWING IS THE HISTORIC LODI BROOK. THERE ARE CONFLICTING REFERENCES, HOWEVER, INDICATING THAT THE ALIGNMENT SHOWN MAY ACTUALLY BE THE CURRENT LODI BROOK. PDI SURVEY ACTIVITIES WILL BE USED TO CONFIRM THE LOCATION OF THE CURRENT LODI BROOK CHANNEL; FUTURE DRAWINGS WILL REFLECT THIS SURVEY INFORMATION. FIELD SAMPLE LOCATIONS PROPOSED ALONG THE HISTORIC LODI BROOK SHOWN ON THIS DRAWING MAY NEED TO BE RELOCATED SHOULD IT BE DETERMINED THAT THE HISTORIC LODI BROOK ALIGNMENT DIFFERS FROM THAT SHOWN.
3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.
4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

30 0 30 60
1"=60'

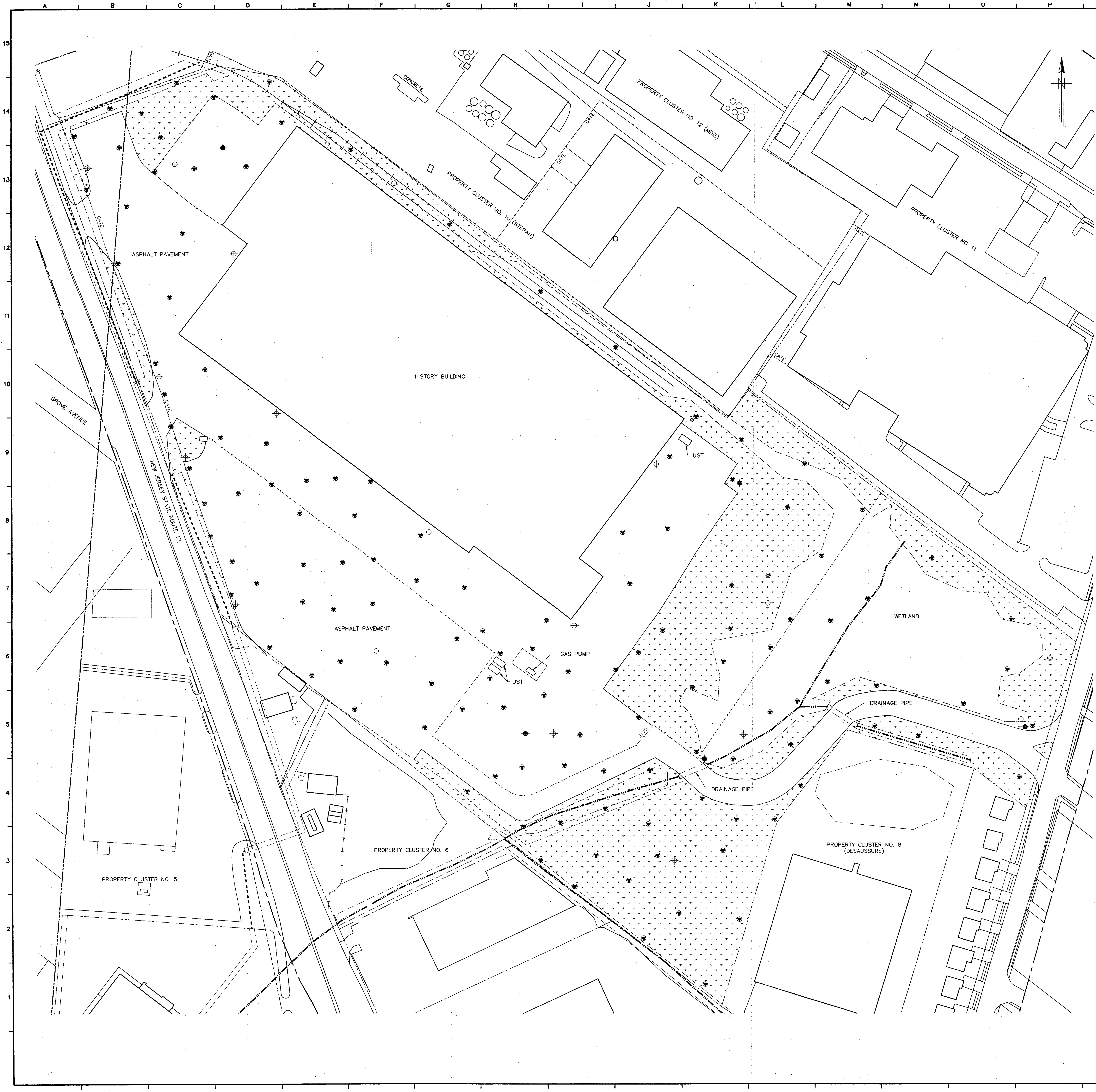
PROPERTY CLUSTER NO. 8: 23 WEST HOWCROFT ROAD

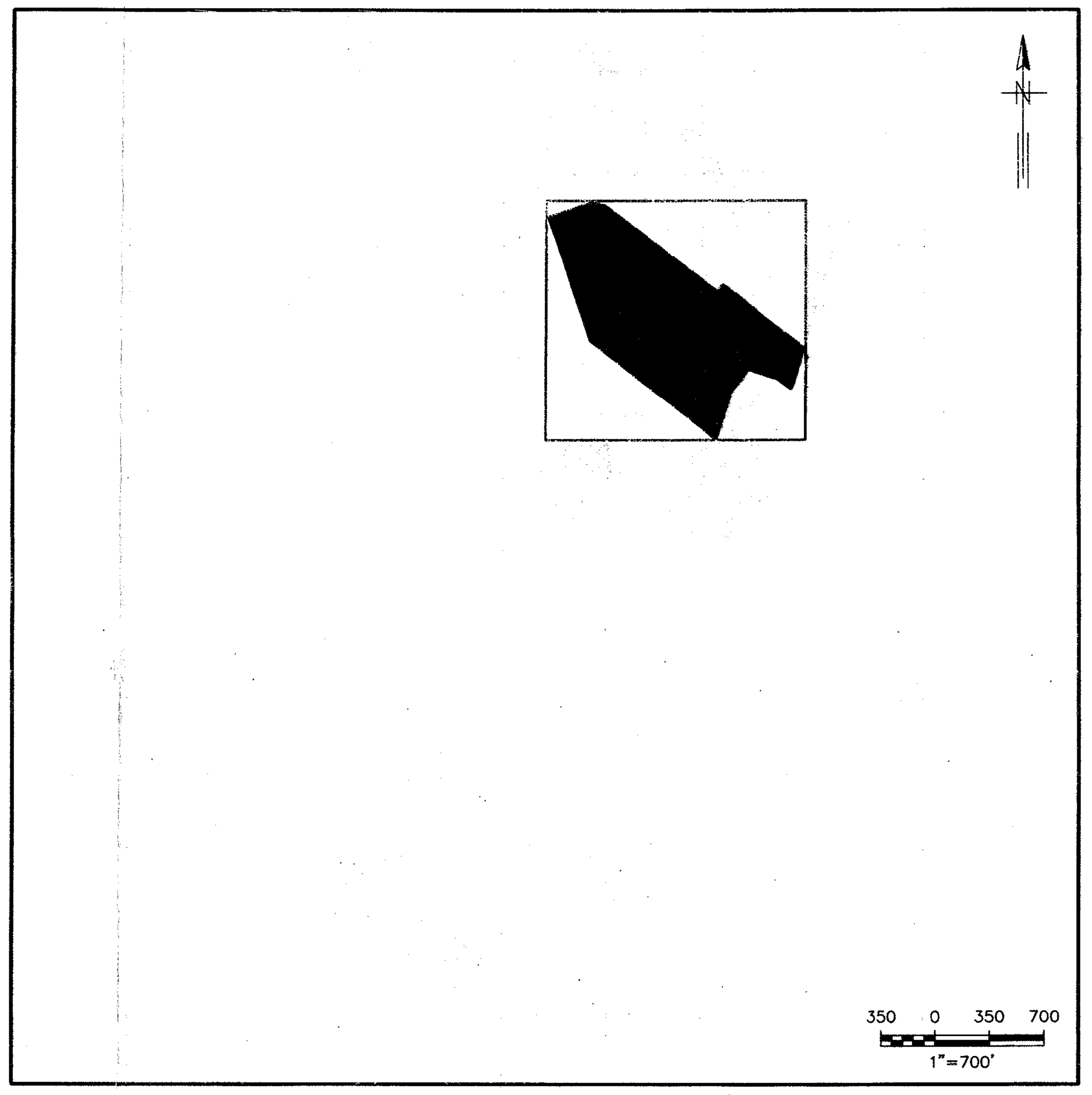
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT
US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES
Prepared by: MALCOLM PIRNIE
Reviewed by: Date:
Drawn by: LGM Date: 6/99
File Name: $MAY–C8.DWG

PROPERTY CLUSTER NO. 8
PROPOSED SAMPLING PROGRAM
PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41–98–R–0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5–8





KEY MAP

LEGEND

STREAM

HISTORIC LODI BROOK CHANNEL

APPROXIMATE WETLAND DELINEATION

PROPERTY BOUNDARY

GRASS (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
▲	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	0
△	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	0
▼	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	130
▽	PROPOSED PUSH-PIPE BACKGROUND	1
⊕	PROPOSED GEOTECHNICAL BORING[3]	17
●	PROPOSED ENVIRONMENTAL BORING[4]	5

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1–5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

ESTIMATED NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY CLUSTER NUMBER	GEOTECHNICAL						CHEMICAL ANALYSES			RADIOLOGICAL ANALYSES
	SPECIFIC GRAVITY	ATTERBERG LIMITS	GRAIN SIZE	WATER CONTENT	TRIAXIAL TESTS (2)	CONSOLID TESTS (2)	CHROMIUM SPECIATION	TCL/TAL	RCRA CHAR.	SOIL SAMPLES (3)
9	TBD	TBD	TBD	TBD	TBD	TBD	5	5	5	13

(1) Sample Analyses Rationale:
a Chromium speciation – Speciation of trivalent and hexavalent chromium for health and safety purposes.
b TCL/TAL – Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
c RCRA Characteristics – To support transportation & disposal activities.
d Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, and Water Content) – To characterize physical properties of soil for excavation and remediation.

(2) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine-grained materials, where present. These parameters will be used to perform engineering analyses where excavations are adjacent to structures.

(3) Surface soil samples will be randomly collected from 10% of the gamma logging and push pipe locations for radiological analyses.

TBD = To be determined.

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE AND WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.

2. MAPPING DEVELOPED BY OTHERS INDICATES THAT THE LODI BROOK SHOWN ON THIS DRAWING IS THE HISTORIC LODI BROOK. THERE ARE CONFLICTING REFERENCES, HOWEVER, INDICATING THAT THE ALIGNMENT SHOWN MAY ACTUALLY BE THE CURRENT LODI BROOK. PDI SURVEY ACTIVITIES WILL BE USED TO CONFIRM THE LOCATION OF THE CURRENT LODI BROOK CHANNEL; FUTURE DRAWINGS WILL REFLECT THIS SURVEY INFORMATION. FIELD SAMPLE LOCATIONS PROPOSED ALONG THE HISTORIC LODI BROOK SHOWN ON THIS DRAWING MAY NEED TO BE RELOCATED SHOULD IT BE DETERMINED THAT THE HISTORIC LODI BROOK ALIGNMENT DIFFERS FROM THAT SHOWN.

3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.

4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

30 0 30 60
1"=60'

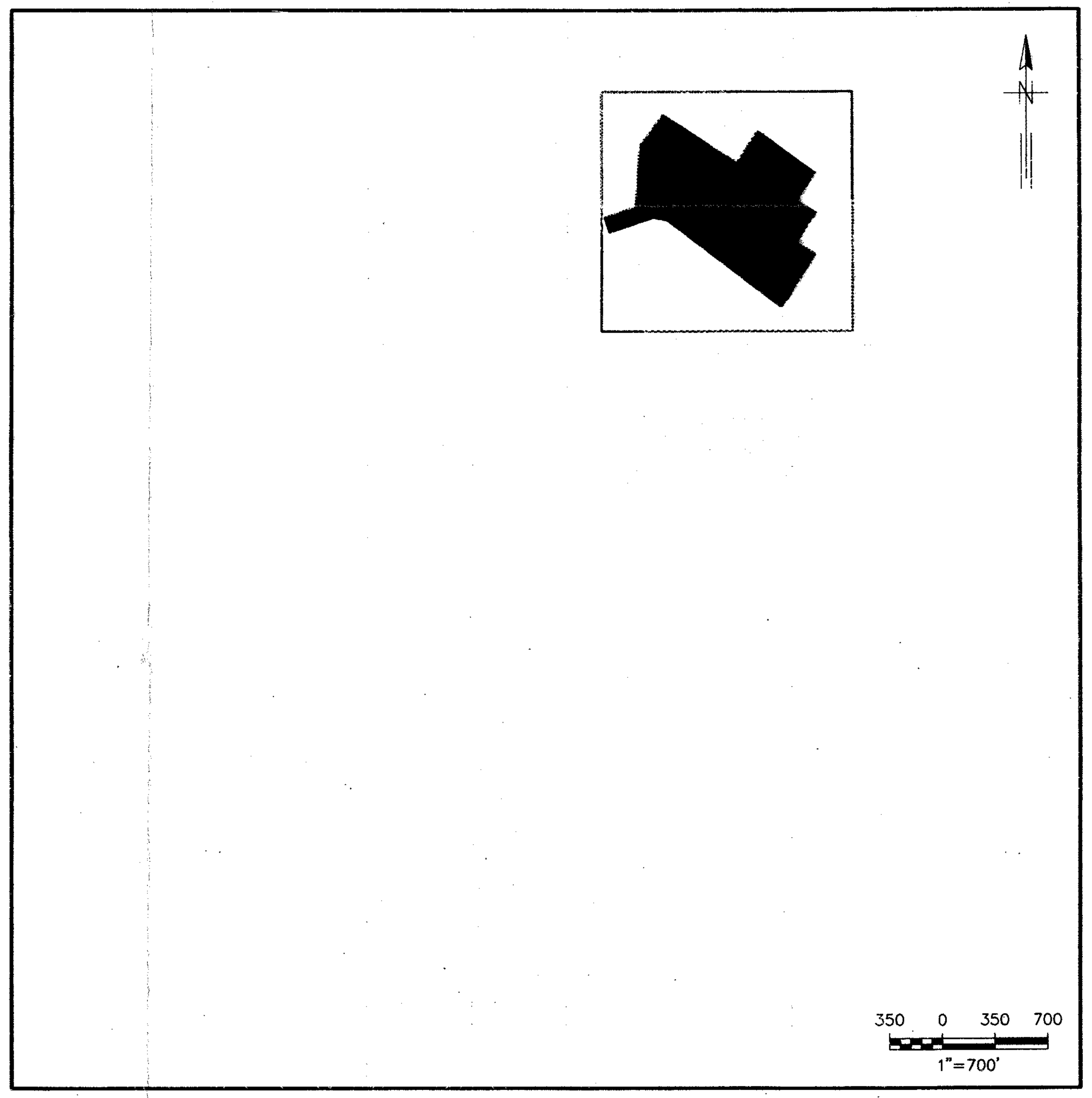
PROPERTY CLUSTER NO. 9: 149–151 MAYWOOD AVENUE (SEARS DISTRIBUTION CENTER)

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT
US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES
Prepared by: MALCOLM PIRNIE
Reviewed by: Date:
Drawn by: LGM Date: 6/99
File Name: $MAY-C9.DWG

PROPERTY CLUSTER NO. 9
PROPOSED SAMPLING PROGRAM
PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND
ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-9



KEY MAP

LEGEND

- FORMER RETENTION POND
- APPROXIMATE WETLANDS DELINEATION
- STREAM
- HISTORIC LODI BROOK CHANNEL
- BOUNDARY BETWEEN BOROUGHS
- PROPERTY BOUNDARY
- GRASS (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
▲	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	25
△	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	2
▼	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	77
▽	PROPOSED PUSH-PIPE BACKGROUND	2
⊕	PROPOSED GEOTECHNICAL BORING[3]	16
●	PROPOSED ENVIRONMENTAL BORING[4]	6

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1–5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

ESTIMATED NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY CLUSTER NUMBER	GEOTECHNICAL						CHEMICAL ANALYSES			RADIOLOGICAL ANALYSES
	SPECIFIC GRAVITY	ATTERBERG LIMITS	GRAIN SIZE	WATER CONTENT	TRIAXIAL TESTS (2)	CONSOLID TESTS (2)	CHROMIUM SPECIATION	TCL/TAL	RCRA CHAR.	SOIL SAMPLES (3)
10	TBD	TBD	TBD	TBD	TBD	TBD	6	6	6	10

(1) Sample Analyses Rationale:
a Chromium speciation – Speciation of trivalent and hexavalent chromium for health and safety purposes.
b TCL/TAL – Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
c RCRA Characteristics – To support transportation & disposal activities.
d Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, and Water Content) – To characterize physical properties of soil for excavation and remediation.
(2) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine-grained materials, where present. These parameters will be used to perform engineering analyses where excavations are adjacent to structures.
(3) Surface soil samples will be randomly collected from 10% of the gamma logging and push pipe locations for radiological analyses.
TBD = To be determined.

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE AND WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.
2. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.
3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.
4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

30 0 30 60
1"=60'

PROPERTY CLUSTER NO. 10: 100 WEST HUNTER AVENUE (STEPAN COMPANY)

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT

US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM

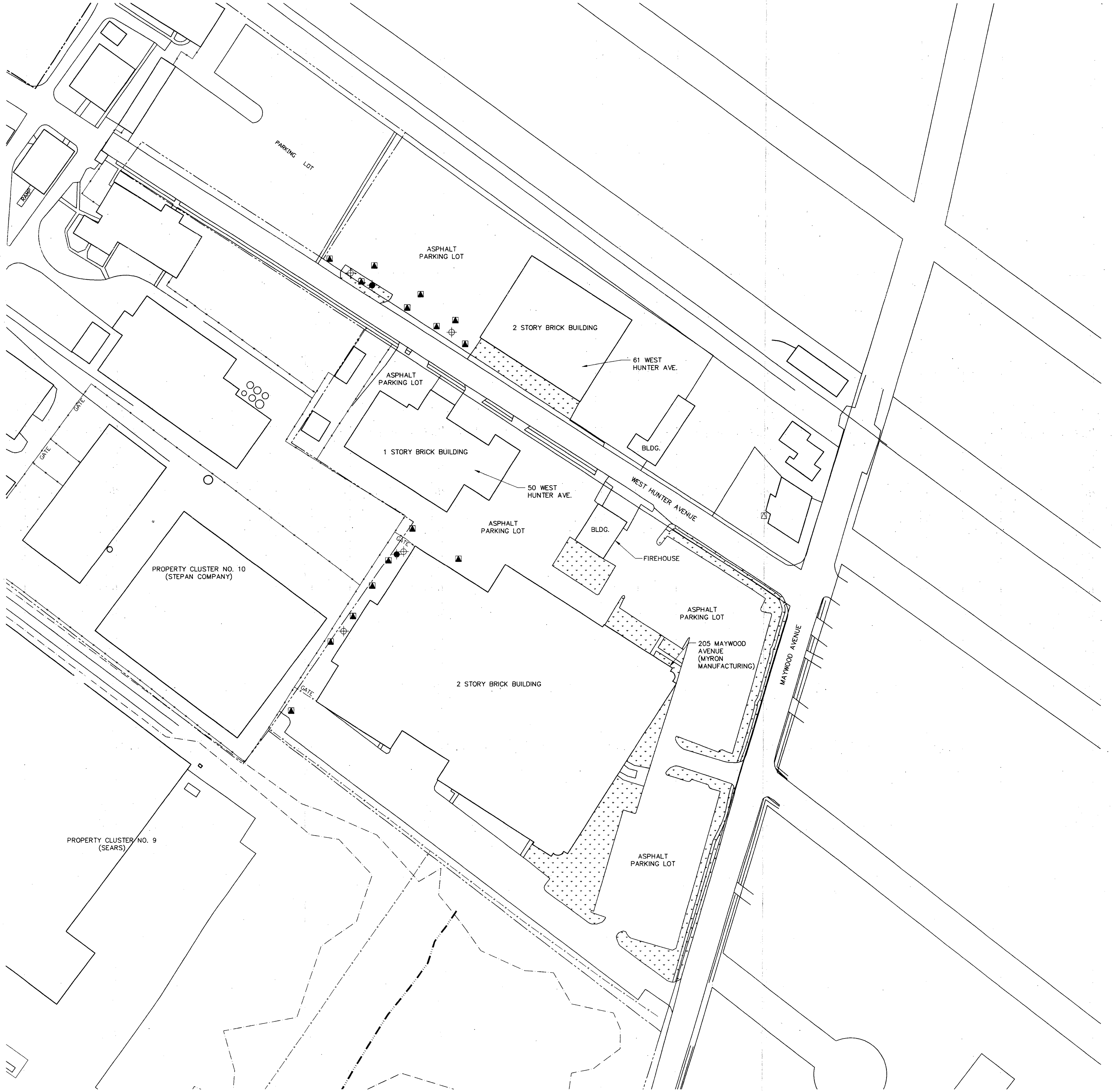
STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES

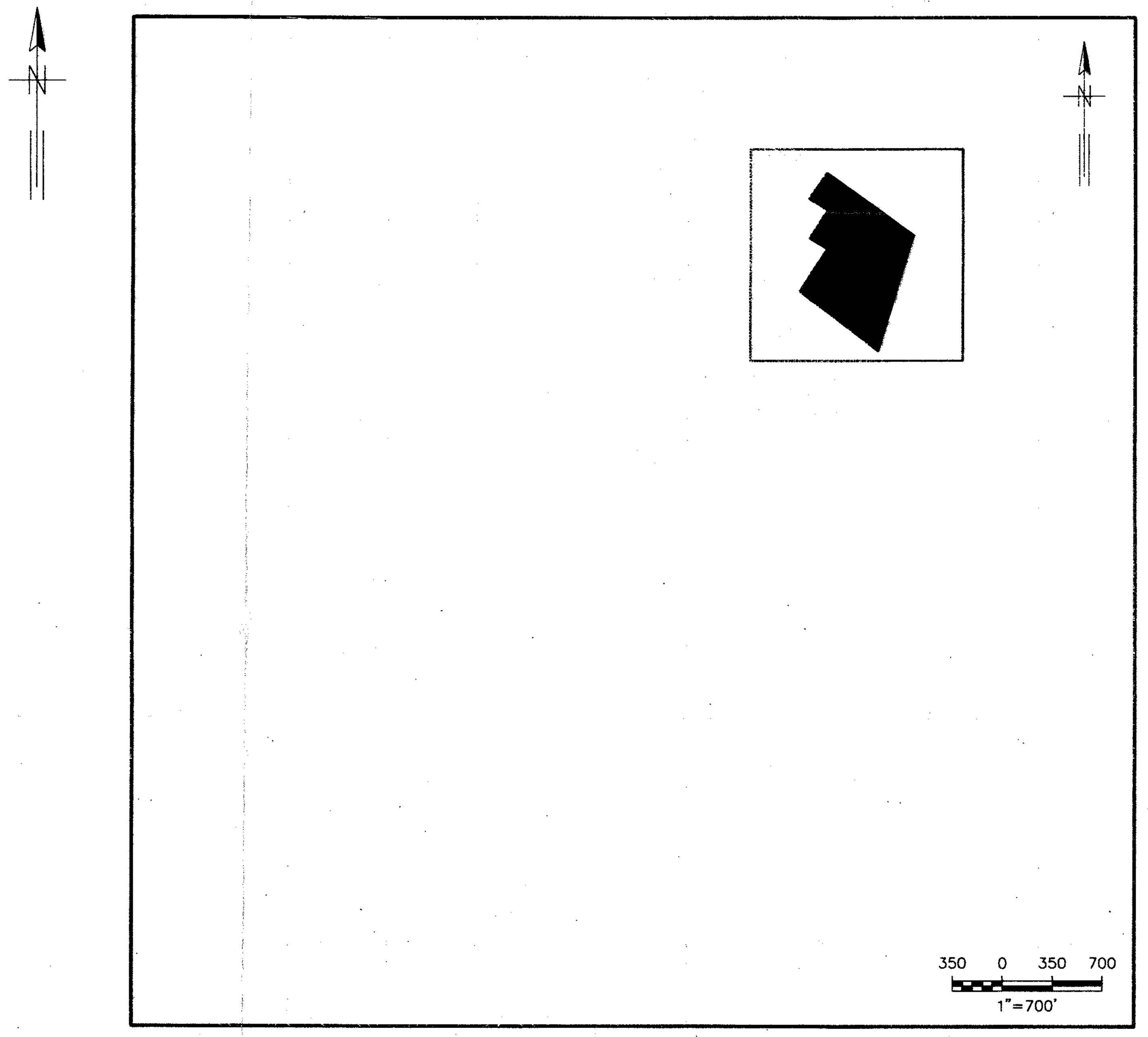
Prepared by: MALCOLM PIRNIE
Reviewed by: Date:
Drawn by: LGM Date: 6/99
File Name: $MAY-C10.DWG

PROPERTY CLUSTER NO. 10
PROPOSED SAMPLING PROGRAM

PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND
ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-10





KEY MAP

LEGEND

APPROXIMATE WETLAND DELINEATION

HISTORIC LODI BROOK CHANNEL

BOUNDARY BETWEEN BOROUGHS

PROPERTY BOUNDARY

GRASS (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	15
	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	1
	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	0
	PROPOSED PUSH-PIPE BACKGROUND	0
	PROPOSED GEOTECHNICAL BORING[3]	4
	PROPOSED ENVIRONMENTAL BORING[4]	2

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1-5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

ESTIMATED NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY CLUSTER NUMBER	GEOTECHNICAL						CHEMICAL ANALYSES			RADIOLOGICAL ANALYSES
	SPECIFIC GRAVITY	ATTERBERG LIMITS	GRAIN SIZE	WATER CONTENT	TRIAXIAL TESTS (2)	CONSOLID TESTS (2)	CHROMIUM SPECIATION	TCL/TAL	RCRA CHAR.	SOIL SAMPLES (3)
11	TBD	TBD	TBD	TBD	TBD	TBD	2	2	2	2

(1) Sample Analyses Rationale:
a Chromium speciation – Speciation of trivalent and hexavalent chromium for health and safety purposes.
b TCL/TAL – Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
c RCRA Characteristics – To support transportation & disposal activities.
d Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, and Water Content) – To characterize physical properties of soil for excavation and remediation.

(2) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine-grained materials, where present. These parameters will be used to perform engineering analyses where excavations are adjacent to structures.

(3) Surface soil samples will be randomly collected from 10% of the gamma logging and push pipe locations for radiological analyses.

TBD = To be determined.

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE AND WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.

2. MAPPING DEVELOPED BY OTHERS INDICATES THAT THE LODI BROOK SHOWN ON THIS DRAWING IS THE HISTORIC LODI BROOK. THERE ARE CONFLICTING REFERENCES, HOWEVER, INDICATING THAT THE ALIGNMENT SHOWN MAY ACTUALLY BE THE CURRENT LODI BROOK. PDI SURVEY ACTIVITIES WILL BE USED TO CONFIRM THE LOCATION OF THE CURRENT LODI BROOK CHANNEL; FUTURE DRAWINGS WILL REFLECT THIS SURVEY INFORMATION. FIELD SAMPLE LOCATIONS PROPOSED ALONG THE HISTORIC LODI BROOK SHOWN ON THIS DRAWING MAY NEED TO BE RELOCATED SHOULD IT BE DETERMINED THAT THE HISTORIC LODI BROOK ALIGNMENT DIFFERS FROM THAT SHOWN.

3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.

4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

PROPERTY CLUSTER NO. 11: 205 MAYWOOD AVENUE
61 WEST HUNTER AVENUE
50 WEST HUNTER AVENUE

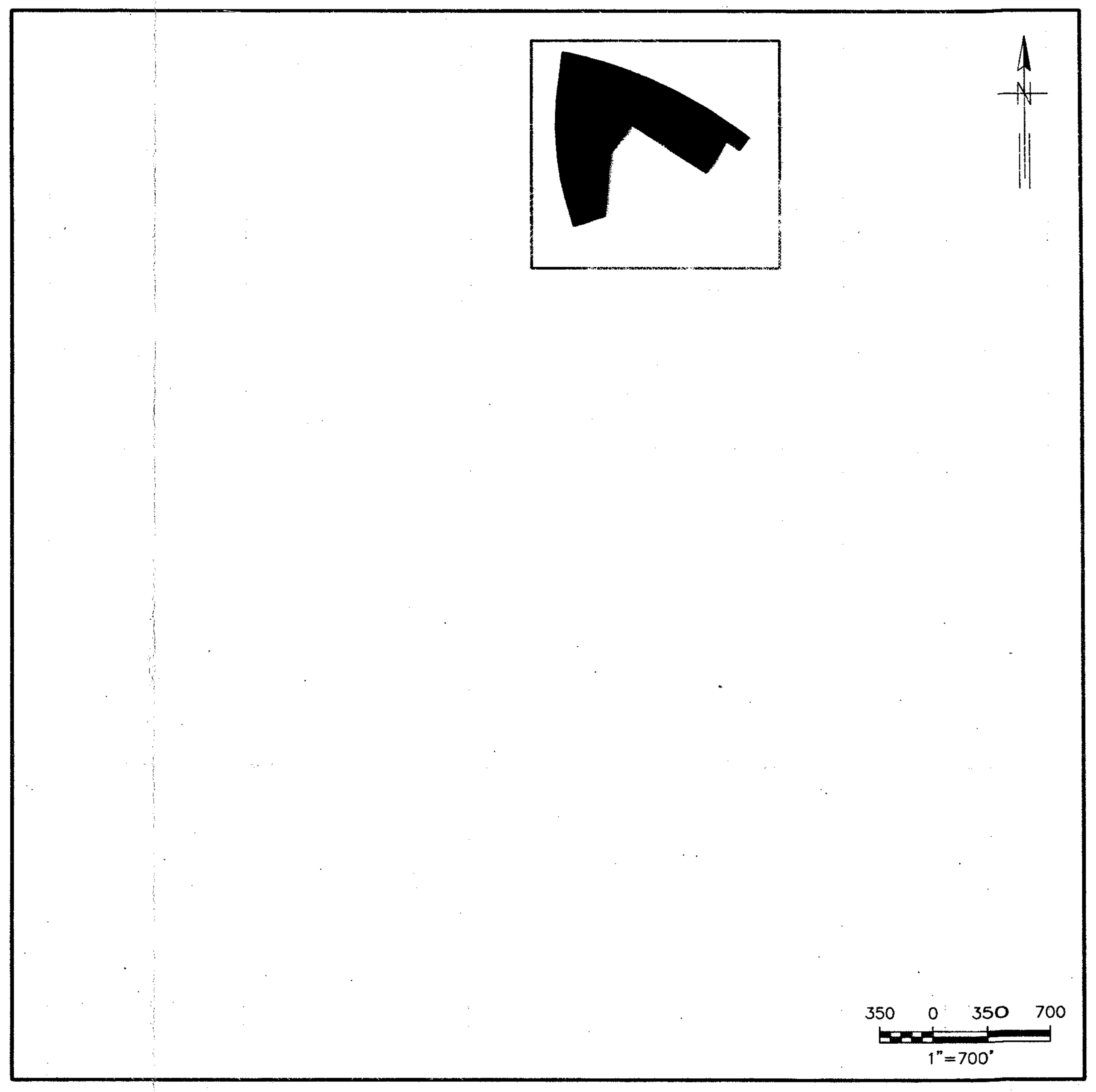
30 0 30 60
1"=60'

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT
US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES
Prepared by: MALCOLM PIRNIE
Reviewed by: Date:
Drawn by: LGM Date: 6/99
File Name: $MAY-C11.DWG

PROPERTY CLUSTER NO. 11
PROPOSED SAMPLING PROGRAM
PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND
ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number:
5-11



KEY MAP

LEGEND

- STREAM
- WESTERLY BROOK
- TOWN BOUNDARY BETWEEN ROCHELLE PARK AND MAYWOOD
- PROPERTY BOUNDARY
- FORMER RETENTION POND
- APPROXIMATE WETLAND DELINEATION
- FENCE LINE
- GRASS (APPROXIMATE)

SAMPLE SYMBOL	SAMPLE TYPE	NUMBER OF SAMPLING LOCATIONS
▲	PROPOSED DOWNHOLE GAMMA LOGGING (1" DIAMETER)[1]	16
△	PROPOSED DOWNHOLE GAMMA LOGGING BACKGROUND	0
●	PROPOSED PUSH-PIPE (4" DIAMETER)[2]	135
○	PROPOSED PUSH-PIPE BACKGROUND	0
⊕	PROPOSED GEOTECHNICAL BORING[3]	17
◆	PROPOSED ENVIRONMENTAL BORING[4]	8

1. SHALLOW SAMPLE DEPTHS, GENERALLY 1-5 FEET.
2. MOST PUSH PIPES INSTALLED TO MAXIMUM DEPTHS OF 10 FEET. WILL BE INSTALLED TO DEEPER DEPTHS IF REQUIRED.
3. DEPTHS TO BE DETERMINED IN FIELD BASED ON RADIOLOGICAL DATA, STRUCTURE FOUNDATIONS DEPTHS, ETC.
4. ADVANCED TO DEPTH OF RADIOLOGICAL CONTAMINATION.

ESTIMATED NUMBER OF SAMPLES FOR ANALYSIS BY PARAMETER (1)

PROPERTY CLUSTER NUMBER	GEOTECHNICAL						CHEMICAL ANALYSES			RADIOLOGICAL ANALYSES
	SPECIFIC GRAVITY	ATTERBERG LIMITS	GRAIN SIZE	WATER CONTENT	TRIAXIAL TESTS (2)	CONSOLID TESTS (2)	CHROMIUM SPECIATION	TCL/TAL	RCRA CHAR.	SOIL SAMPLES (3)
12	TBD	TBD	TBD	TBD	TBD	TBD	8	8	8	15

(1) Sample Analyses Rationale:
a Chromium speciation - Speciation of trivalent and hexavalent chromium for health and safety purposes.
b TCL/TAL - Detection of organic and inorganic constituents to assess the potential for the presence of commingled radiological and chemical contamination.
c RCRA Characteristics - To support transportation & disposal activities.
d Geotechnical Parameters (Specific Gravity, Atterberg Limits, Grain Size, and Water Content) - To characterize physical properties of soil for excavation and remediation.

(2) It is assumed that triaxial tests and consolidation tests will be performed on undisturbed tube samples to determine strength and consolidation parameters of fine-grained materials, where present. These parameters will be used to perform engineering analyses where excavations are adjacent to structures.

(3) Surface soil samples will be randomly collected from 10% of the gamma logging and push pipe locations for radiological analyses.

TBD = To be determined.

NOTES:

1. BASE MAPPING WAS PROVIDED BY SAIC. SPECIFIC SITE FEATURES, INCLUDING BUILDING OUTLINES, LIMITS OF ASPHALT, ETC. WERE LOCATED BASED ON INFORMATION CULLED FROM AERIAL PHOTOGRAPHS, BECHTEL DOCUMENTS, DOT MAPPING AND WINDSHIELD SURVEYS PERFORMED BY THE STONE AND WEBSTER TEAM. ACTUAL SITE CONDITIONS MAY VARY FROM THOSE SHOWN. FUTURE SURVEYS WILL BE PERFORMED TO DEVELOP DESIGN QUALITY MAPPING.
2. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.
3. LOCATION OF PROPOSED BOREHOLES ARE APPROXIMATE. SOME BOREHOLES MAY BE REQUIRED TO BE OFFSET BASED UPON ACTUAL FIELD CONDITIONS, ACCESS, INTERFERENCE WITH OVERHEAD AND UNDERGROUND UTILITIES AND FINAL RESULTS OF GAMMA AND GEOPHYSICAL SURVEYS.
4. METHODS FOR INSTALLING BOREHOLES (RADIOLOGICAL/GEOTECHNICAL/ENVIRONMENTAL) PROXIMATE TO STRUCTURES MAY NEED TO DIFFER FROM THOSE SPECIFIED IN THIS PDI WORK PLAN IN ORDER TO BE PROTECTIVE OF THOSE STRUCTURES.

30 0 30 60
1"=60'

PROPERTY CLUSTER NO. 12: 100 WEST HUNTER AVENUE (MISS)
NEW YORK, SUSQUEHANNA AND WESTERN RAILROAD,
NEW JERSEY STATE ROUTE 17

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
NEW YORK DISTRICT

US ARMY CORPS OF ENGINEERS
FUSRAP
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES

Prepared by: MALCOLM PIRNIE
Reviewed by:
Date:
Drawn by: LGM
Date: 6/99
File Name: $MAY-C12.DWG

PROPERTY CLUSTER NO. 12
PROPOSED SAMPLING PROGRAM

PRELIMINARY DESIGN INVESTIGATION REPORT
FUSRAP MAYWOOD SUPERFUND SITE
MAYWOOD, LODI, AND
ROCHELLE PARK, NEW JERSEY

Contract Number: DACW41-98-R-0034
Job Number 08575
WAD# 3
WBS# 10
Figure Number: 5-12

6.0 PRE-DESIGN INVESTIGATION REPORT

The investigations conducted at the 12 clusters will be documented in a PDI report. The report will contain the results of all environmental, geotechnical, and radiological characterization data and graphical representation of the horizontal and vertical extent of the soil containing radiologically concentration which exceed criteria.

This report will further include a compilation of the data and information collected during the field investigation along with the data validation and data evaluation summaries on appropriate data.

The findings presented in this report will be directly utilized in the Design Analysis Report, which will contain the breadth and substance of all analyses, criteria, decisions, and assumptions that underlie and substantiate the design of the remedial efforts for the Maywood Site.

7.0 PROJECT ORGANIZATION

The PDI team will be led by the PDI Task Manager, who will have full authority to direct project scope, schedule, and budget for the PDI work. The PDI Task Manager will report directly to the Project Environmental Engineer, and will be supported throughout the PDI effort by the resources and facilities of the entire team. The PDI Task Manager will interact directly with the USACE Project Manager and will manage all project work from planning through completion of the PDI and project close-out.

The field team members will be selected for their qualifications and experience with the technical issues to be addressed at each property cluster. These individuals are the radiological, geotechnial, environmental engineers and scientists. A typical field team will consist of the Field Team Leader, as well as Site Safety and Health Officer, Site Health Physicist, Sampling Technicians, and sub-contractors. These individuals will report to the Field Team Leader, who will report to the PDI Task Manager. The efforts of the project team will be supported by the project personnel, as required.

8.0 REFERENCES

References used to prepare this report are listed in Table 8-1 on the following page.

TABLE 8-1: REFERENCES

Admin. Record No.	Document Author	Date of Publication	Document Title
8 Mill Street (NJ Vehicle Inspection Station)			
M-119	Bechtel National, Inc.	June 1987	Characterization Report for the New Jersey Vehicle Inspection Station Property
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-737	DOE/ORNL	1984	Results of the Radiological Survey at 8 Mill Street, Lodi, New Jersey
n/a	Environmental Data Resources, Inc.	Report ordered 3/99	EDR-Radius Report
160&174 Essex St. (National Community Bank)			
M-054	DOE/ORNL	June 1989	Results of the Radiological Survey at 174 Essex Street, Lodi, New Jersey
M-058	DOE/ORNL	1989	Results of the Radiological Survey at 160 Essex Street, Lodi, New Jersey
M-075	Bechtel National, Inc.	September 1989	Radiological Characterization Report for the Commercial Property at 160 and 174 Essex Street (National Community Bank)
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
n/a	Environmental Data Resources, Inc.	Report ordered 3/99	EDR-Radius Report
80 Industrial Rd. (former Flint Ink; current Jewel Windows)			
M-074	Bechtel National, Inc.	September 1989	Radiological Characterization Report for the Commercial Property at 80 Industrial Road (Flint Ink Corporation)
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-711	DOE/ORNL	July 1989	Results of the Radiological Survey at 80 Industrial Road, Lodi, New Jersey
n/a	Environmental Data Resources, Inc.	Report ordered 3/99	EDR-Radius Report
80 Hancock St. (former AIRCO Medical; current CGI)			
M-046	DOE/ORNL	March 1989	Results of the Radiological Survey at 80 Hancock Street, Lodi, New Jersey
M-085	Bechtel National, Inc.	September 1989	Radiological Characterization Report for the Commercial Property at 80 Hancock Street, Lodi, New Jersey

Admin. Record No.	Document Author	Date of Publication	Document Title
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
n/a	Environmental Data Resources, Inc.	Report ordered 3/99	EDR-Radius Report
100 Hancock St. (former Heather Hill; current Appleton Electric)			
M-048	DOE/ORNL	March 1989	Results of the Radiological Survey at 100 Hancock Street, Lodi, New Jersey
M-078	Bechtel National, Inc.	September 1989	Radiological Characterization Report for the Commercial Property at 100 Hancock Street, Lodi, New Jersey
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
n/a	Environmental Data Resources, Inc.	Report ordered 3/99	EDR-Radius Report
149-151 Maywood Ave. (Sears Distribution Center)			
M-108	Bechtel National, Inc.	August 1985	Survey Plan for the Radiological Characterization of the Sears and Scanel Properties
M-110	Bechtel National, Inc.	July 1986	Characterization Plan for Sears and Adjacent Properties
M-118	Bechtel National, Inc.	May 1987	Characterization Report for the Sears Property
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
200 Rt. 17 (Sears Small Truck Repair)			
M-209	Bechtel National, Inc.	December 1992	Remedial Investigation Report for the Maywood Site
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-715	DOE/ORNL	February 1989	Results of the Radiological Survey at 200 State Route 17 Maywood, New Jersey
n/a	Environmental Data Resources, Inc.	Report ordered 3/99	EDR-Radius Report
239 Rt. 17 (Gulf Station)			
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site

Admin. Record No.	Document Author	Date of Publication	Document Title
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
113 Essex St. (former National Community Bank; current Bank of New York)			
M-209	Bechtel National, Inc.	December 1992	Remedial Investigation Report for the Maywood Site
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-728	DOE/ORNL	September 1989	Results of the Radiological Survey at the National Community Bank, 113 Essex Street, Maywood, New Jersey
n/a	Environmental Data Resources, Inc.	Report ordered 3/99	EDR-Radius Report
100 West Hunter (Stepan Company)			
M-209	Bechtel National, Inc.	December 1992	Remedial Investigation Report for the Maywood Site
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices for the initial site evaluation)
M-597	DOE/ORNL	July 1996	Stage IA Archaeological Study and State II Historical Study of the Maywood Site
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
n/a	Environmental Data Resources, Inc.	Report ordered 3/99	EDR-Radius Report
100 West Hunter (Maywood Interim Storage Site, Government Owned)			
M-012	Bechtel National, Inc.	April 1985	Remedial Action Workplan for the Maywood Site (Revision 1)
M-019	Bechtel National, Inc.	October 1985	Report on Drilling and Well Installations at the Maywood Interim Storage Site
M-023	Bechtel National, Inc.	March 1986	Engineering Evaluation of Disposal Alternatives for Radioactive Waste from Remedial Actions in and Around Maywood, New Jersey
M-024	Bechtel National, Inc.	March 1986	Remedial Action Workplan for the Maywood Site (Revision 2)
M-030	Bechtel National, Inc.	June 1987	Maywood Interim Storage Site Annual Site Environmental Report - Calendar Year 1986
M-032	Bechtel National, Inc	April 1988	Maywood Interim Storage Site Annual Site Environmental Report - Calendar Year 1987
M-035	Bechtel National, Inc.	March 1985	Maywood Interim Storage Site Environmental Monitoring Summary - Calendar Year 1984
M-096	Bechtel National, Inc.	April 1989	Maywood Interim Storage Site Annual Site Environmental Report - Calendar Year 1988
M-099	Bechtel National, Inc.	September 1984	Environmental Monitoring Plan for the Maywood Site
M-109	Bechtel National, Inc.	May 1986	Characterization Plan for the Maywood Interim Storage Site
M-120	Bechtel National, Inc.	June 1987	Characterization Report for the Maywood Interim Storage Site
M-150	Bechtel National, Inc	September 1991	Maywood Interim Storage Site Annual Environmental Report - Calendar Year 1990
M-209	Bechtel National, Inc.	December 1992	Remedial Investigation Report for the Maywood Site
M-254	Bechtel National, Inc	May 1993	Maywood Interim Storage Site Environmental Report - Calendar Year 1992

Admin. Record No.	Document Author	Date of Publication	Document Title
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-637	DOE/ORNL	June 1997	FUSRAP 1996 NESHAP Annual Reports - Submittal to EPA Region II
M-638	DOE/ORNL	December 1996	Maywood Interim Storage Site Environmental Surveillance Plan
170 Gregg Street (Bergen Cable)			
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-116	Bechtel National, Inc.	August 1986	Radiological Characterization Report for Bergen Cable in Lodi, New Jersey
M-736	Oak Ridge National Laboratory	October 1984	Results of the Radiological Survey at 170 Gregg Street (LJ001), Lodi, New Jersey (Administrative Record for the Maywood Site, New Jersey
23 West Howcroft Road (DeSaussure)			
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-697	United States Army Corps of Engineers	August 1994	Maywood Remedial Investigation Data Inventory for Groundwater, Surface Water, and Sediment (Administrative Record)
M-076	Bechtel National, Inc.	September 1989	Radiological Characterization Report for the DeSaussure Property
M-292	Department of Energy	November 1993	Transmittal of Groundwater Analytical Results Oak Ridge Operations, (Administrative Record, Maywood, New Jersey)
205 Maywood Avenue/50 and 60 West Hunter Avenue (Myron Manufacturing)			
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-209	Bechtel National, Inc.	December 1992	Remedial Investigation Report For The Maywood Site
137 Route 17 (Former Federal Express, Current Uniform Fashions)			
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-121	Bechtel National, Inc	July 1987	Radiological Characterization Report for the Federal Express Property

Admin. Record No.	Document Author	Date of Publication	Document Title
167 Route 17 (Sunoco Station)			
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-123	Bechtel National, Inc	July 1987	Radiological and Limited Chemical Characterization Report for the Sunoco Station Property
85-101 Route 17 (Former Hunter Douglas and SWS Realty)			
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-122	Bechtel National, Inc	July 1987	Radiological and Limited Chemical Characterization Report for the Hunter Douglas Property
99 Essex Street (Muscarelle)			
M-698	Bechtel National, Inc.	August 1994	Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site
M-727	Bechtel National, Inc	November 1990	Results from Ground Penetrating Radar Survey at the Stepan Chemical and Muscarelle Sites
N/A	Environmental Resolutions, Inc	February 1999	Remedial Investigation Proposed Sampling Plan for the New Jersey State Highway Route 17 at Essex Street in Maywood, New Jersey
New York, Susquehanna and Western Railroad			
M-097	Bechtel National, Inc	November 1983	Survey Plan for the Radiological Characterization of the Vicinity Properties of the Stepan Chemical Plant
I-80 Westbound Right-of-way			
M-056	Oak Ridge National Laboratory	June 1989	Results of the Radiological Survey at Interstate 80, North Right of Way at Lodi Brook, Lodi. New Jersey
M-091	Bechtel National, Inc	September 1989	Radiological Characterization Report for the Property at Interstate 80 (Eastbound Right of Way
N/A	Bechtel National, Inc	December 1992	Remedial Investigation Report for the Maywood Site, Volume 1, Maywood, New Jersey
88 Money Street/72 Sidney Street			
M-083	Bechtel National, Inc	September 1989	Radiological Characterization Report for the Commercial Property at 72 Sidney Street
M-733	Oak Ridge National Laboratory	September 1989	Results of the Radiological Survey at 72 Sidney Street Lodi, New Jersey
107 Essex Street (Scanel Property/Hackensack and Lodi Railroad)			
M-111	Bechtel National, Inc	September 1986	Radiological Survey Report for the Scanel Property
M-174	Bechtel National, Inc	September 1986	Scanel Property Surveys
New Jersey Route 17 (State Property)			
M-114	Bechtel National, Inc	December 1986	Radiological Characterization Report for NJ Route 17 in Rochelle Park, New Jersey
29 Essex Street (Federal Express)			

Admin. Record No.	Document Author	Date of Publication	Document Title
M-575	CH2M Hill	November 1994	Maywood Chemical Company Site, Final Remediation Investigation Report (note: reviewers had access only to excerpts of the text with no appendices, for the initial site evaluation)
M-112	N/A	N/A	Letter to Whitely Division-Voit Sports with Characterization Results
M-117	N/A	N/A	Letter regarding radiological status of AMF/Voit Property
Additional References			
N/A	SAIC	02/99 (date of receipt)	Maywood Data Gap Package
N/A	Stone & Webster/ACOE	04/09/99	Draft Letter Trip Report (letter contains notes from meetings between property representatives and Stone & Webster representatives)

APPENDIX A

PROPERTY BACKGROUND
AND
RECONNAISSANCE INFORMATION

FUSRAP MAYWOOD SUPERFUND SITE
PRE-DESIGN INVESTIGATION OF 24 PHASE II PROPERTIES

EXECUTIVE SUMMARY

The Stone and Webster Team (the Team) has completed development of the Pre-Design Investigation (PDI) Work Plan for Phase II properties at the FUSRAP Maywood Superfund Site, performed in accordance with U.S. Army Corps of Engineers Prime Contract No. DACW41-99-D-9001. This document comprises a summary of the 24 properties reviewed by the Team. The properties included in this submittal are as follows:

Property Cluster No. 1:
88 Money (former Schenck Chevrolet, also formerly referred to as 72 Sidney St.; current vacant lot)

Property Cluster No. 2:
80 Hancock St. (former AIRCO Medical; current CGI)
100 Hancock St. (former Heather Hill; current Appleton Electric)
80 Industrial Rd. (former Flint Ink; current Jewel Windows)
8 Mill St. (NJ Vehicle Inspection Station)

Property Cluster No. 3:
170 Gregg St. (Bergen Cable)

Property Cluster No. 4:
160 & 174 Essex St. (National Community Bank)
I-80 West (Right-of-way and underneath roadway)

Property Cluster No. 5:
Rt. 17 South and Essex St. (Joseph Muscarelle Assoc.)
113 Essex St. (former National Community Bank; current Bank of New York)
200 Rt. 17 (Sears Small Truck Repair)

Property Cluster No. 6:
29 Essex St. (former AMF/Voit; current Fed Ex)
85-101 Rt. 17 (former Hunter Douglas and SWS Realty; current Architectural Window Manufacturing Corp, Meta-Life Custom Fabricators, Firehouse Office, Kentitec Computer, and Computer Service Center)
137 Rt. 17 (former Fed Ex; current Uniform Fashions)
167 Rt. 17 (Sunoco Station)
239 Rt. 17 (Gulf Station)

Property Cluster No. 7:
111 Essex St. (Scanel Property / Hackensack & Lodi Railroad)

Property Cluster No. 8:
23 W. Howcroft Ave. (DeSaussure Equip.)

Property Cluster No. 9:
149-151 Maywood Ave. (Sears Distribution Center)

Property Cluster No. 10:
100 West Hunter (Stepan Company)

Property Cluster No. 11:
205 Maywood Ave. / 50 and 61 West Hunter (Myron Manufacturing)

Property Cluster No. 12:
100 West Hunter (Maywood Interim Storage Site, Government owned)
New York, Susquehanna & Western Railroad
NJ Rt. 17 (state property)

For each site, existing documentation has been reviewed to determine whether sufficient information exists to proceed with design activities. Summary sheets and checklists which address the data requirements have been completed for each property and are included in this final submittal.

Based on the information available to the Team and reviewed to date, data gaps have been identified at various properties. The PDI Work Plan, which was developed based on the information contained in this and other preliminary PDI submittals, addresses the specific data collection activities that will fill these data gaps.

Each site-specific write-up summarizes the data needs for that site. It should be noted that, where appropriate, required field activities will be coordinated with those required for other aspects of the project (e.g., the groundwater investigation) in order to avoid unnecessary duplication.

Property Cluster No. 1

- 88 Money Street (a.k.a. 72 Sidney Street)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

88 MONEY STREET/72 SIDNEY STREET

A. Description of Property

The property at 72 Sidney Street is a vacant lot with a gravel surface. The property consists of Lots 1, 5 and the southern part of Lot 9. Lot 9 is not contaminated and was recently sold by the owner, Ms. Barbara Schwartz. It is fenced off from the rest of the property and is inaccessible. The property was formerly used as an automobile parking area by a local automobile dealer, Schenck Chevrolet. It is located on the corner of Money and Sidney Streets, next to a used car dealership. To the north lies Kennedy Park and to the south lies State Route 46. To the west, there are residential properties. The Right-of-Entry has been signed.

B. Site-Specific Geology

A total of ten geologic borings conducted on-site in 1987 by Bechtel National, Inc. (BNI) indicated a silty sandy gravel fill with coal, coal ash and plant fragments, underlain by gray clay with iron staining and some sand, silty sand, fine-grained with some gravel and iron nodules, silt, dark gray-brown in color, laminated, and fine- to medium- grained sand, yellowish-brown in color.

In soil borings 2038R and 2035R, a layer of sandy gravel at 7.5 to 11 ft was found to contain large angular chunks which looked like riprap, which were saturated in an iridescent liquid with a strong fuel oil odor. Color was dark grey. This was underlain by a sandy silt.

C. Site Specific Geophysical

There is no site-specific geophysical information for this property.

D. Site-Specific Geotechnical

There is no site-specific geotechnical information for this property.

E. Site-Specific Hydrogeology

Geologic boring logs indicate that groundwater was encountered at 6 to 8 ft below grade.

F. Civil/Survey Information

There is no site specific civil/survey information for this property.

G. Underground Utilities

There is no site-specific underground utility information for this property.

H. Previous Investigations (Radiological)

The initial radiological characterization was performed by Oak Ridge National Laboratory (ORNL). The data from that effort are provided in Results of the Radiological Survey at 72 Sidney Street, Lodi, New Jersey (M-733, ORNL/RASA-88/18, September, 1989). A surface gamma scan did not reveal exposure rates in excess of the range due to natural background, with 3-9 μR/h found throughout the property.

Seven boreholes were installed to depths of approximately 8 feet and subsurface soil samples were collected for radionuclide analyses. Thorium-232 was identified as the primary contaminant of concern; a maximum concentration of 16 pCi/g was found. In general, thorium and to a lesser extent radium concentrations were elevated in samples collected at depths of approximately 2-4.5 feet. Gamma logging count rate data collected within boreholes indicated marginal contamination extending from 2-5 feet below the ground surface.

Radiological data were presented by Bechtel National, Inc. (BNI) in Radiological Characterization Report For The Commercial Property at 72 Sidney Street, M-083, DOE/OR/20722-245, September, 1989. It describes their investigation, which consisted of collection of surface and subsurface soil samples for thorium, radium and uranium analysis. Boreholes were installed and downhole gamma count rate data were collected. An exposure rate survey was not possible to the presence of numerous parked vehicles on the lot.

Surface soil samples did not contain significantly elevated concentrations of radionuclides of concern. All ^{232}Th and ^{226}Ra concentrations were less than 2 pCi/g. Subsurface soil exhibited marginal contamination, with a maximum ^{232}Th concentration of 6.2 pCi/g. Gamma logging data indicated that the contaminated material was present in a layer approximately 2.5 feet below the ground surface located in the northern corner of the property, coinciding with the location of the former Lodi Brook and its associated floodplain. This area is identified on the attached figure.

I. Previous Investigations (Environmental)

There is no environmental investigation information for this property.

J. Summarize Data Gaps

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil to be acquired for remedial design.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to roads or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for roads or other structures to be protected will also be required.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Hydrogeological Data - Some site-specific hydrogeological data is available; however, it does not constitute a site-wide hydrogeological characterization. It may be necessary to obtain additional hydrogeological data in order to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - Additional data are needed to define the extent of contamination. It is possible that the depth of contamination is such that hand-installed boreholes, surface in situ gamma spectroscopy data, and collection of subsurface soil samples for radionuclide analyses may be sufficient to complete the PDI. If contaminated residues exist at depths greater than a few feet, then borehole installation/downhole gamma spectroscopy measurements will be needed to determine the vertical extent of contamination.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements will be outlined in the Groundwater Investigation Work Plan.

References

(M-083), Radiological Characterization Report for the Commercial Property at 72 Sidney Street, Bechtel National, Inc., September 1989.

(M-733), Results of the Radiological Survey at 72 Sidney Street Lodi, New Jersey (LJ067), Oak Ridge National Laboratory, September 1989.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Vacant lot

Property Address: 88 Money St./72 Sidney St.

County/State: Lodi, New Jersey

Property Use:

Company Name: Stamato, Vito Family Ltd., Partnership

Company Contact Name : Ms. Barbara Schwartz

Company Contact Address/Phone No.: (973) 783-5050

Current Property Use: Vacant lot

Hours of Operation: None

Past Uses: Formerly used by Schenck Chevrolet, a used car dealership. A Sanborn map shows that the property used to be a gasoline station in the 1950s.

Property Description:

Lot Size: Approx. ½ acre

No. of Buildings : None

Building(s) size (each): Not applicable

Year built: Not applicable

Zoning: Commercial

Uses of Adjacent Properties:

North:	Kennedy Park
East:	Used Car Dealership
South:	NJ State Route 46
West:	Residential

Nearest structure on adjacent properties and each side of site boundary:
North - None
East – Used car dealership
South – State Route 46
West - Residential housing

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ______
Equipment ID No.: ______
Installation Date: ______
Labels: ______
Fluid volume: ______

Is there any secondary containment?
Unknown

Is any of the equipment leaking or damaged? If so, describe: Unknown

Is there any known history of leaks or discharges?
Unknown

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:
No, vacant lot

Were there past operations conducted on the property that required the use of USTs? If so, describe: Unknown

Are there any USTs removed from service, but left in the ground?
Unknown

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).NA

Any history of leak or discharge from ASTs? NA

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: No

Describe condition of containers (is there any corrosion or leakage?)
NA

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Hazardous Waste Storage and Disposal

EPA Identification number for site: NA

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
NA

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Water and Wastewater

Are there any sanitary or septic system on the site?
No

Note source of water for the site, and identify on-site wells
None, vacant lot

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County.
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	PDI Investigation
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	Groundwater Investigation
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan		x	PDI Investigation
Downhole Gamma Logging		x	PDI Investigation

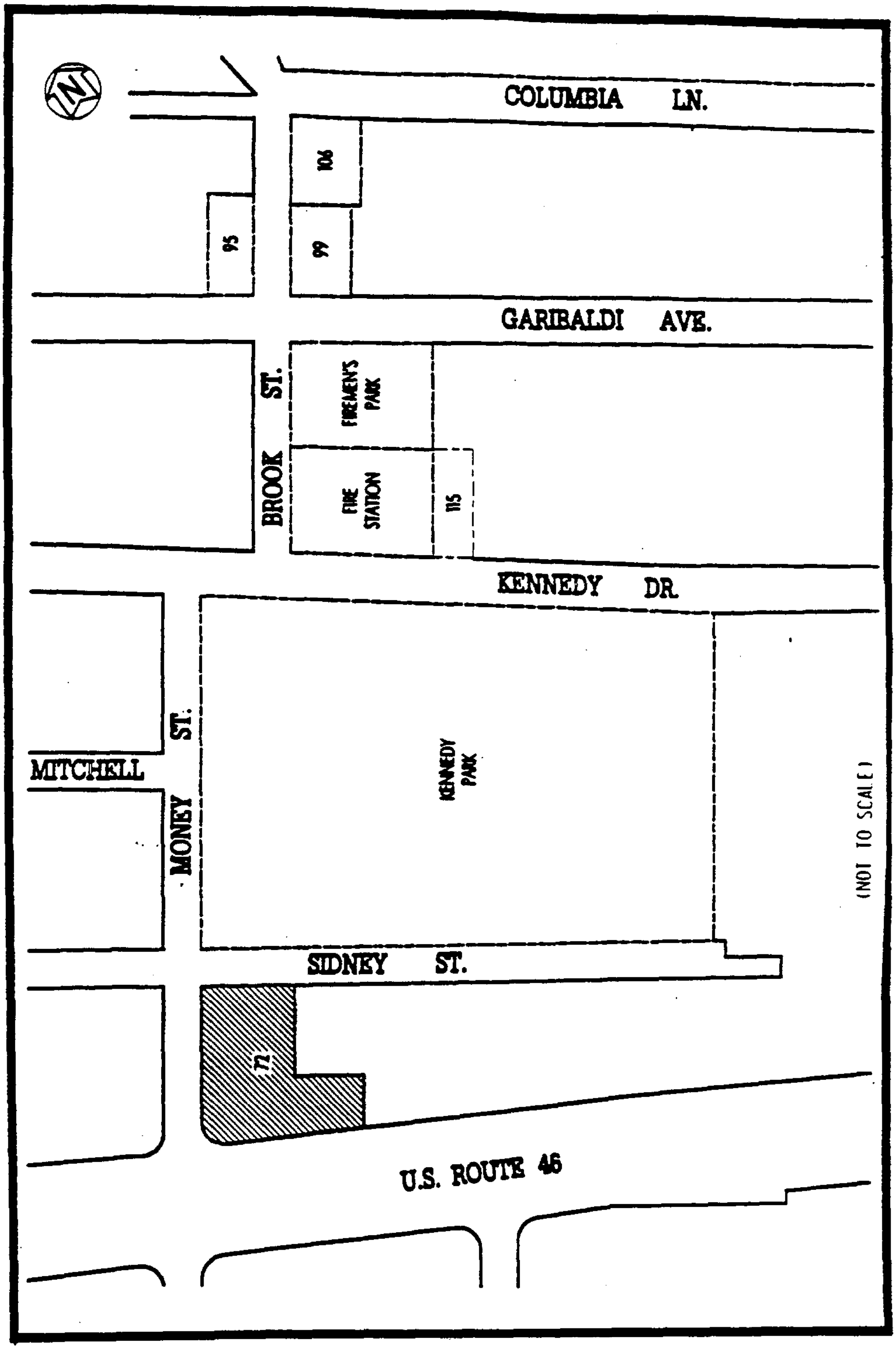


FIGURE 1-2 LOCATION OF 72 SIDNEY STREET

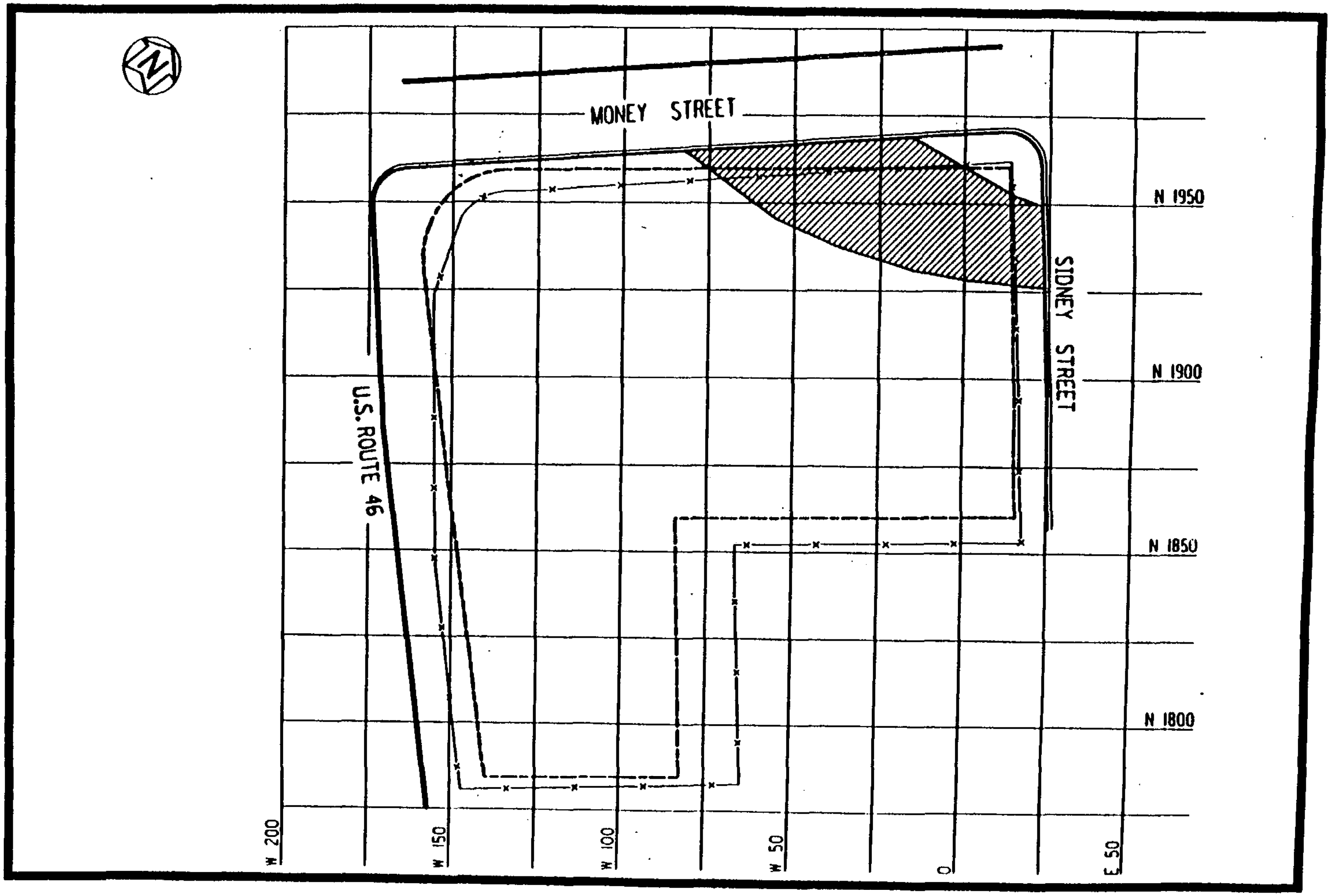


FIGURE 5-1 AREAS OF SUBSURFACE CONTAMINATION AT 72 SIDNEY STREET

N38W9854.DGN

Property Cluster No. 2

- 80 Hancock Street
- 100 Hancock Street
- 80 Industrial Road
- New Jersey Vehicle Inspection Station (NJVIS)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

80 HANCOCK STREET

A. Description of Property

The 80 Hancock Street property is located in Lodi, New Jersey, in Bergen County. It is bordered by the 100 Hancock property on the northeast, an unknown property on the southeast, Industrial Road and the 80 Industrial Road property on the southwest, and Hancock Street and residential homes on the northwest. The lot size is approximately 2 acres and is mostly covered by the building and pavement. A portion of the site (approx. 8,750 square feet), from the building to Hancock Street, is covered with grass. The site is currently owned by FMRN Realty Company, a real estate brokerage, and is leased to BOC and in turn to subtenant CGI Industries, Inc. Previous lesee's include Airco Welding Supply and Airco Medical and Specialty Products. A 1994 report (M-698) noted that Airco employed approximately 20 people in its handling and processing of compressed gas cylinders.

A small block building (toolshed), approx. 750 sf in size, is located on the east corner of the site. This building is leased to BOC. BOC leases the main building to CGI. The main building consists of a 1½-story concrete block building, approximately 33,000 sf (proposal). The front portion of the building houses offices and a lunchroom. The remaining portion of the building consists of a gas cylinder filling and storage area, a loading dock, a maintenance area, and a small paint booth. There is an extensive open storage area east of the site (proposal). An underground storage tank (UST) has recently been removed from the vicinity of the toolshed, and a groundwater solvent plume is currently being monitored by Killam Associates. Groundwater is less than 10 ft.

CGI bottles compressed gas for medical and laboratory use (O_2, CO_2, CO, N, He, Acetylene, etc.). CGI has a no open flame and no torches rule in some parts of the building because of the oxygen bottling. The northern drive entrance from Hancock Street is critical for the shipment of bottles. The large, heavy trucks cannot make the turn from Industrial Road and must use the Hancock St. entrance. Access to 80/100 Hancock St. may have to be worked out at the same time. Parking is limited, approximately 18 spaces. Hours of operation are from 6:00 am to 10:00 pm, Monday to Friday. The facility is closed on weekends and most truck traffic has ceased by 5:30 pm.

B. Site-Specific Geology

Sixteen boreholes to 10-foot depth were placed in and around the site. Twelve were located on the site, 3 in Hancock Street and 1 in Industrial Road. The boreholes indicate that the pedology of the site consists of 0 to 6 feet of gravel fill, over 5 to 8 feet of silty sand (typically very fine-grained), over 5.5 to 10 feet of sand. In paved areas, the asphalt is up to 6 inches thick. (M-085). The bedrock, Brunswick Sandstone, occurs erratically, with the top at 7.5 in front of the loading dock on Industrial Road.

C. Site Specific Geophysical

No information has been found on geophysical information.

D. Site-Specific Geotechnical

No information has been found on geotechnical laboratory information.

E. Site-Specific Hydrogeology

Boreholes taken on the site indicate that the water table on the east and northeast side sits at 8 to 9 feet below grade. It is unknown whether the groundwater around the remaining site is also at 8 to 9 feet below grade. No other hydrogeological information was found.

F. Civil/Survey Information

No survey information was found showing topography, or building structural features.

G. Underground Utilities

A data search of storage tanks indicates that two USTs were installed on site in 1971. One, a 3,000 gallon tank, stored No. 2 Diesel, and the other, a 2,000 gallon tank, stored leaded gasoline. Both tanks are constructed of steel. The search also indicated that there may be a third UST that is (or has been) leaking. It is not known what was contained in this third tank, or the exact location of any of the tanks. No further information was found on the presence of underground utilities.

H. Previous Investigations (Radiological)

Results of radiological surveys were reported by Oak Ridge National Laboratory (M-046) in ORNL/RASA-88/16, by Bechtel National, Inc. in DOE/OR/20722-253 (M-085), and in the Administrative record of USACE (M-698). Characterization activities consisted of indoor and outdoor gamma and exposure rate scans, surface and subsurface soil sampling, indoor radon/thoron sampling, and borehole installation/downhole gamma logging. The location of the surface and subsurface contamination is shown on the attached figures.

The indoor radon/thoron measurements were within natural background levels, and the indoor and outdoor exposure rates were slightly above the natural background level.

Surface soil samples collected from 10 locations showed ^{232}Th, ^{226}Ra, and ^{238}U concentrations less than the minimum detectable concentrations of 8.6 pCi/g, 1.4 pCi/g, and 7.7 pCi/g, respectively. Subsurface soil samples collected at 15 locations showed maximum ^{232}Th, ^{226}Ra, and ^{238}U concentrations of 35 pCi/g, 4 pCi/g, and 32 pCi/g, respectively. Contamination in excess of the cleanup levels was only detected in two surface and two subsurface soil samples. The downhole gamma logging data indicated the presence of radioactive contamination to a maximum depth of 7 feet.

The aforementioned reports do not specifically estimate the volume of contaminated material. However, in the scope of work prepared for the field demonstration project, the ACE estimated 4,012 cubic yards of contaminated material on the property.

I. Previous Investigations (Environmental)

No documents have been found on environmental testing. However, several boring logs noted a strong petroleum odor adjacent to a diesel UST on the northeast side of site at the 0 to 5 feet depth range. Facility Index System database (FINDS) notes that the facility is a hazardous waste generator, and has an active water discharge permit under PCS. The facility is monitored or permitted for air emissions under the Clean Air Act (AFS/AIRS) (EDR Report).

J. Summarize Data Gaps

Pilot Study Data Gaps:

Radiological - The contamination on the property is located in front of the building near the northeast corner. Inaccessible contamination is believed to be present beneath the building and paved areas, where the former Lodi brook flowed. Based on the existing data, it is quite possible that sufficient volumes of contaminated soil in outdoor areas are not easily accessible. Therefore, this property is not a viable candidate for use in the pilot study.

Design Data Gaps:

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement. Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - Some chemical data exists for site soil and groundwater; however, this data is not sufficient to characterize site soils and groundwater for remedial design (including disposal) and health and safety purposes.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: 80 Hancock Street

Property Address: 80 Hancock Street

County/State: Bergen County, New Jersey

Property Use:

Company Name: CGI Industries (subtenant-main bldg); BOC (tenant-toolshed)

Company Contact Name : Keith Redding, Scott Perkins (FMRN Realty)

Company Contact Address/Phone No.:
(973) 773-8700, (973) 684-4700

Current Property Use: Bottle and sell liquid (compressed) gas cylinders (M-85)

Hours of Operation: 40 hours per week (8-hour days)

Past Uses: Airco, liquid gas cylinders (M-85)

Property Description:

Lot Size: 2 acres

No. of Buildings : Two

Building(s) size (each): 1½-story concrete block bldg, approx. 33,000 sf (proposal); a small block bldg on east corner of property (M-85)

Year built: Between 1956 and 1978 (M-597)

Zoning: Unknown - possibly Commercial

Uses of Adjacent Properties:

Northeast:	100 Hancock Property (AT&T Wireless, present, Heather Hill, M-597, 1996; Appleton Electronics, M-85, 1989)
Southeast:	Unknown. Possibly additional commercial property.
Southwest:	Industrial Road and 80 Industrial Property
Northwest:	Hancock Street and Single and multiple family homes

Nearest structure on adjacent properties and each side of site boundary:
Commercial building
Unknown
Commercial Building
Residential Housing

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property?

Type of equipment:	1 transformer located on the north side of the bldg.
Equipment ID No.:	Unknown
Installation Date:	Unknown
Labels:	Unknown
Fluid volume:	Unknown

Is there any secondary containment?

Is any of the equipment leaking or damaged? If so, describe:

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property?
Boring logs (M-085) note UST (diesel) on northeast portion of site.

	Tank 1	Tank 2	Tank 3
Tank capacity:	Unknown	3,000 gal	2,000 gal
Substance Stored:	Unknown	No. 2 Diesel	Leaded Gas
Installation Date:	Unknown	1971	1971
Registration (Y/N)	Yes	Yes	Yes
Corrosion protection	Unknown	No	No
Single or double-walled	Unknown	Unknown	Unknown
Leak detection tests (Y/N)	Yes	Unknown	Unknown
Results of testing:	Leaking	NA	NA

Any known history of leaks ? One tank from the vicinity of the toolshed has recently been removed. A groundwater solvent plume is currently being monitored.

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:

Were there past operations conducted on the property that required the use of USTs? If so, describe:

Are there any USTs removed from service, but left in the ground?

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).No

Any history of leak or discharge from ASTs? No

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Liquid/compressed gas cylinders - bottled and distributed. Unknown quantities.

Describe condition of containers (is there any corrosion or leakage?)
Unknown; cylinders stored inside building.

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: NJDO45661204

Hazardous waste stored or generated on site *(Includes biological or medical)*	Quantities:	Disposition of Haz. Waste
Compressed Gas	Unknown	Unknown

Describe condition of hazardous waste containers (is there any corrosion or leakage?)

Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Area very developed; most likely city septic system used.

Note source of water for the site, and identify on-site wells
Area very developed; most likely city water source.

Note if site falls within floodplain, describe direction of runoff.
North side of site falls within floodplain of former Lodi Brook.

Note if any water quality data is available for on-site wells.

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	EDR INC.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines			Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Property Owner
Foundation Drawings			Property owner
Loading & Foundation Design Dwgs.			Property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water			Generically via boreholes for down gamma testing
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

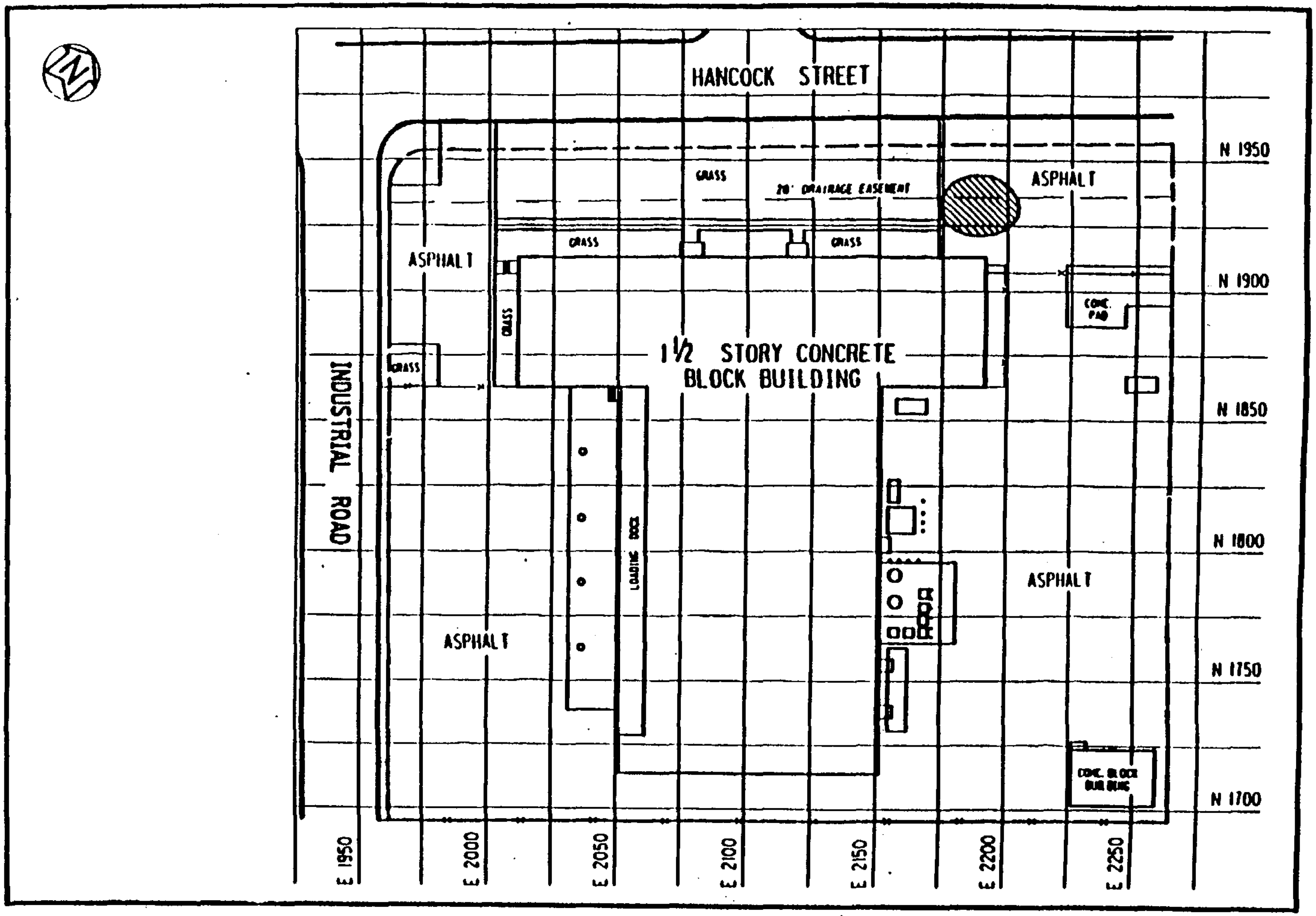


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FIGURE 5-1 AREAS OF SURFACE CONTAMINATION AT 80 HANCOCK STREET

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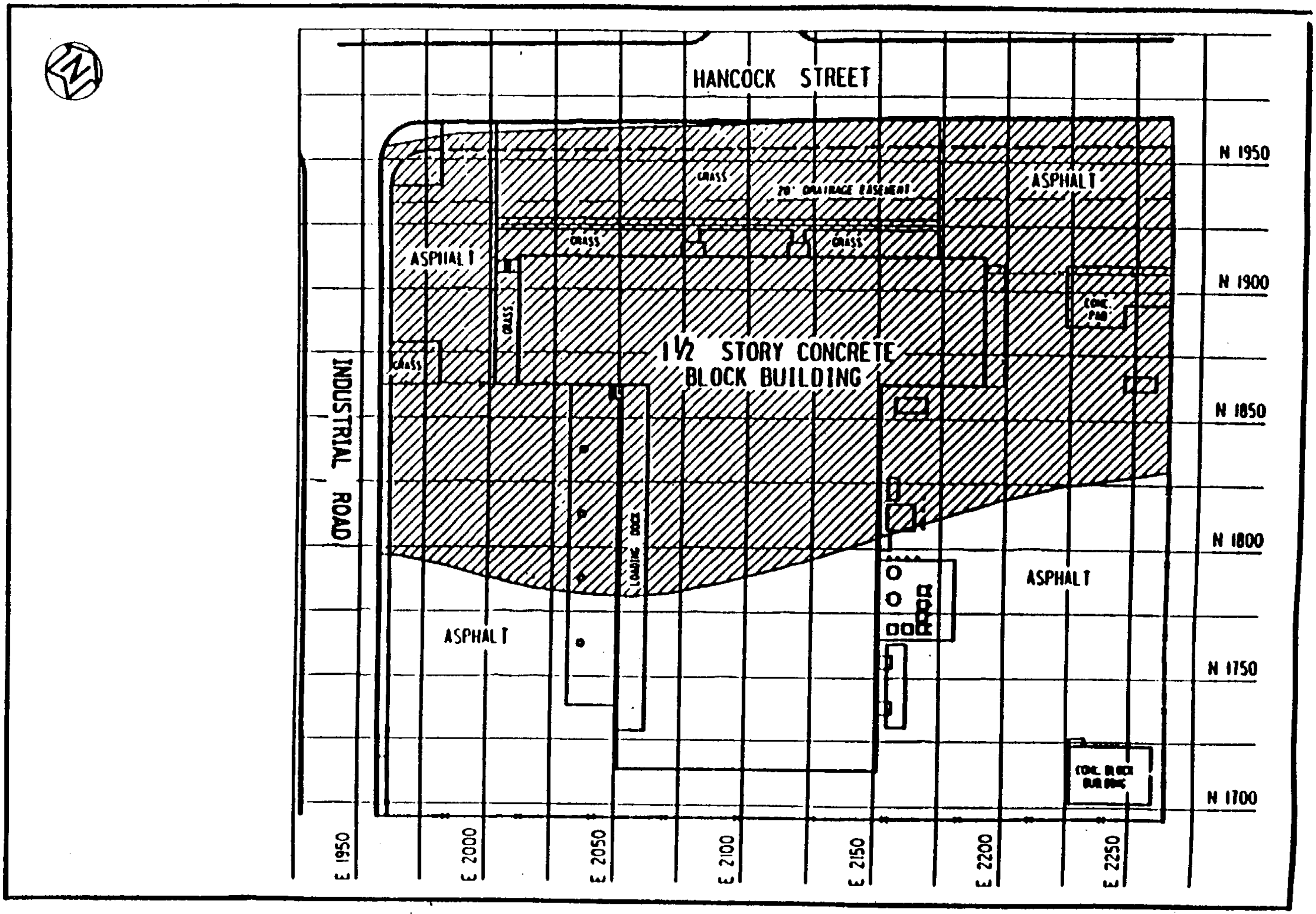

FIGURE 5-2 AREAS OF SUBSURFACE CONTAMINATION AT 80 HANCOCK STREET

NJBW9856.DGN

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

100 HANCOCK STREET

A. Description of Property

B.

The 100 Hancock Street property, formerly Heather Hill and Appleton Electronic, is owned by a real estate brokerage, SBWE Real Estate, and leased by the current tenant, AT&T Wireless. The property occupies approximately 1.5 acres, slopes gently, drains to the north, and consists of a concrete block building with a grassy area and an asphalt-paved parking lot to the front of the building. A drainage swale and vertical drain inlet exists along the north side of the building, which borders a residential property. Along the eastern side of the building is another grassy area with an inactive railroad spur. The western side of the building is bordered by an asphalt-paved loading area that adjoins another commercial property and area of concern, 80 Hancock Street. The property is situated in a densely populated residential neighborhood; however, other commercial properties are located in close proximity. On the south side of Industrial Road is another area of concern, the 80 Industrial Road property. On the eastern side of the property is an open culvert which intersects the buried conduit containing the present-day channel of Lodi Brook, which runs parallel to Hancock Street. Prior to realignment, Lodi Brook was thought to run across the property in a southwesterly direction in the area where the building now stands. This former channel is the suspected transport mechanism for the radiological contamination found on-site. AT&T Wireless hours of operation are 6:00 am to 6:00 pm with Cleaners leaving at 7:00-8:00 pm. There is sporadic weekend activity and also 24 hr/day emergency personnel on call. The former tenant, Heather Hill company, was engaged in the ordering, sales, and shipping of sportswear. During the time when the property was owned by Appleton Electronic, the primary use of the site was the distribution of electronic components.

B. Site-Specific Geology

A general soil description, taken from on-site soil boring logs, is as follows: Approximately 3 ft of sandy silt fill overlies 5 ft of clayey sandy silt, approximately 4 ft of silty Sand, and also a gravely sandy clay (possibly till?) (thickness unknown). The fill contains mixed organic flecks, brick, and gravel with a sandy silt loam, brown to dusky red in color. The fill is dry, soft and lacks cohesion. The clayey sandy silt is light olive gray to yellowish gray in color, slightly moist, cohesive, and becomes sandy with depth. The silty sand is a medium- to coarse-grained sand, subangular, poorly sorted with 20% silt, adhesive due to moisture content and contains mixed feldspar and quartz minerals. The gravely sandy clay/till contains poorly sorted gravels and sands, moist to slightly moist and crumbles easily. Elsewhere on the site, the silt layer is absent or diminished. Top of undisturbed soil is found at 5.2 to 9.1 ft. Bottom of borehole was at 14 ft. Depth to bedrock is unknown.

C. Site Specific Geophysical

No geophysical information was located for this property.

D. Site-Specific Geotechnical

No geotechnical laboratory data was located for this property.

E. Site-Specific Hydrogeology

Depth to water table ranged from 5 ft to 11.8 ft below grade (Document # M-078). No other hydrogeologic information was located.

F. Civil/Survey Information

No Civil/Survey information was located for this property.

G. Underground Utilities

No Utility information was located for this property.

H. Previous Investigations (Radiological)

Results of radiological surveys were reported by Oak Ridge National Laboratory (M-048) in ORNL/RASA-88/15, by Bechtel National, Inc. in DOE/OR/20722-254 (M-078), and in the Administrative record of USACE (M-698). Characterization activities consisted of indoor and outdoor gamma and exposure rate scans, surface and subsurface soil sampling, indoor radon/thoron sampling, and borehole installation/downhole gamma logging. The location of the surface and subsurface contamination is shown on the attached figures.

The indoor radon/thoron measurements were within natural background levels, and the maximum near-surface exposure rate was slightly elevated (41 μR/h).

Surface soil samples collected from 11 locations showed ^{232}Th, ^{226}Ra, and ^{238}U maximum concentrations 8 pCi/g (M-078), 1.9 pCi/g, and 6.7 pCi/g, respectively. Subsurface soil samples collected at 11 locations showed ^{232}Th, ^{226}Ra, and ^{238}U maximum concentrations of 529 pCi/g (M-048), 5.4 pCi/g (M-048), and 7.2 pCi/g (M-078), respectively. Contamination in excess of the cleanup levels were only detected in a small number of soil samples.

On the basis of near-surface gamma radiation measurements, surface and subsurface soil sample analysis, and downhole gamma logging, contamination on this property exist at depths ranging from 3.5 to 9 feet. Contiguous subsurface contamination covers less than one-half of the property and is located on the northwestern portion of the property. Surface contamination was found in two small areas located in the northeastern side of the property. Inaccessible contamination is believed to be present beneath the building and paved areas, in the area formerly occupied by the Lodi Brook. In the scope of work prepared for the field demonstration project, the ACE estimated 1,733 cubic yards of contaminated material on the property.

I. Previous Investigations (Environmental)

No environmental investigation information was found for the 100 Hancock St. property.

J. Summarize Data Gaps

Pilot Study Data Gaps:

Radiological - Pilot Study: Based on the existing data, it is likely that while a sufficient volume of contaminated soil may be present for use in a pilot study, it is not fully located in areas which are easily accessible. Therefore, this property is not a viable candidate for use in the pilot study.

Design Data Gaps:

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Civil/Survey Data - Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Work Plan.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement. Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: None

Property Address: 100 Hancock Street

County/State: Lodi, New Jersey

Property Use:

Company Name: AT&T Wireless

Company Contact Name : Tom (last name unknown), Tony Aguiar, Hancock Realty- Robert Wellins

Company Contact Address/Phone No.: (201) 986-7382, (201) 288-4500

Current Property Use: AT&T Wireless

Hours of Operation: 5 days, 12 hours a day, sporadic weekend activity

Past Uses: Appleton Electronics - Distribution of electronic components, Heather Hill- ordering, sales, and shipping of sportswear

Property Description:

Lot Size: 1.5 acres (6,300 m^2)

No. of Buildings : One

Building(s) size (each): 2,000 m^2 approximately

Year built: Unknown

Zoning: Commercial

Uses of Adjacent Properties:

North:	Property abuts residential properties and Trudy Drive
East:	Commercial - MOVI, Inc.
South:	Commercial - 80 Hancock St.
West:	Residential properties and Hancock Street

Nearest structure on adjacent properties and each side of site boundary:
Residential Housing
Building
Building
Residential Housing

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ______
Equipment ID No.: ______
Installation Date: ______
Labels: ______
Fluid volume: ______

Is there any secondary containment?

______

Is any of the equipment leaking or damaged? If so, describe: ______

______

Is there any known history of leaks or discharges?

______

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? ____________________

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? ____________________

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:
Unknown

Were there past operations conducted on the property that required the use of USTs? If so, describe: Unknown

Are there any USTs removed from service, but left in the ground?

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? ______________________

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). ______________________

Any history of leak or discharge from ASTs? ______________________

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
NA

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Hazardous Waste Storage and Disposal

EPA Identification number for site: ______________________________

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
NA

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Water and Wastewater

Are there any sanitary or septic system on the site?

A drainage swale lies on the north side of the building. The swale is wide and about 3 ft deep at its west end.

Note source of water for the site, and identify on-site wells

Municipal water supply

Note if site falls within floodplain, describe direction of runoff.

The site is sloped and drains generally towards the north.

Note if any water quality data is available for on-site wells.

NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Potentially from property owner
Foundation Drawings			Potentially from property owner
Loading & Foundation Design Dwgs.			Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	Groundwater Investigation
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification	x		PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction			PDI Investigation
Specific Gravity			PDI Investigation
Consolidation			PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

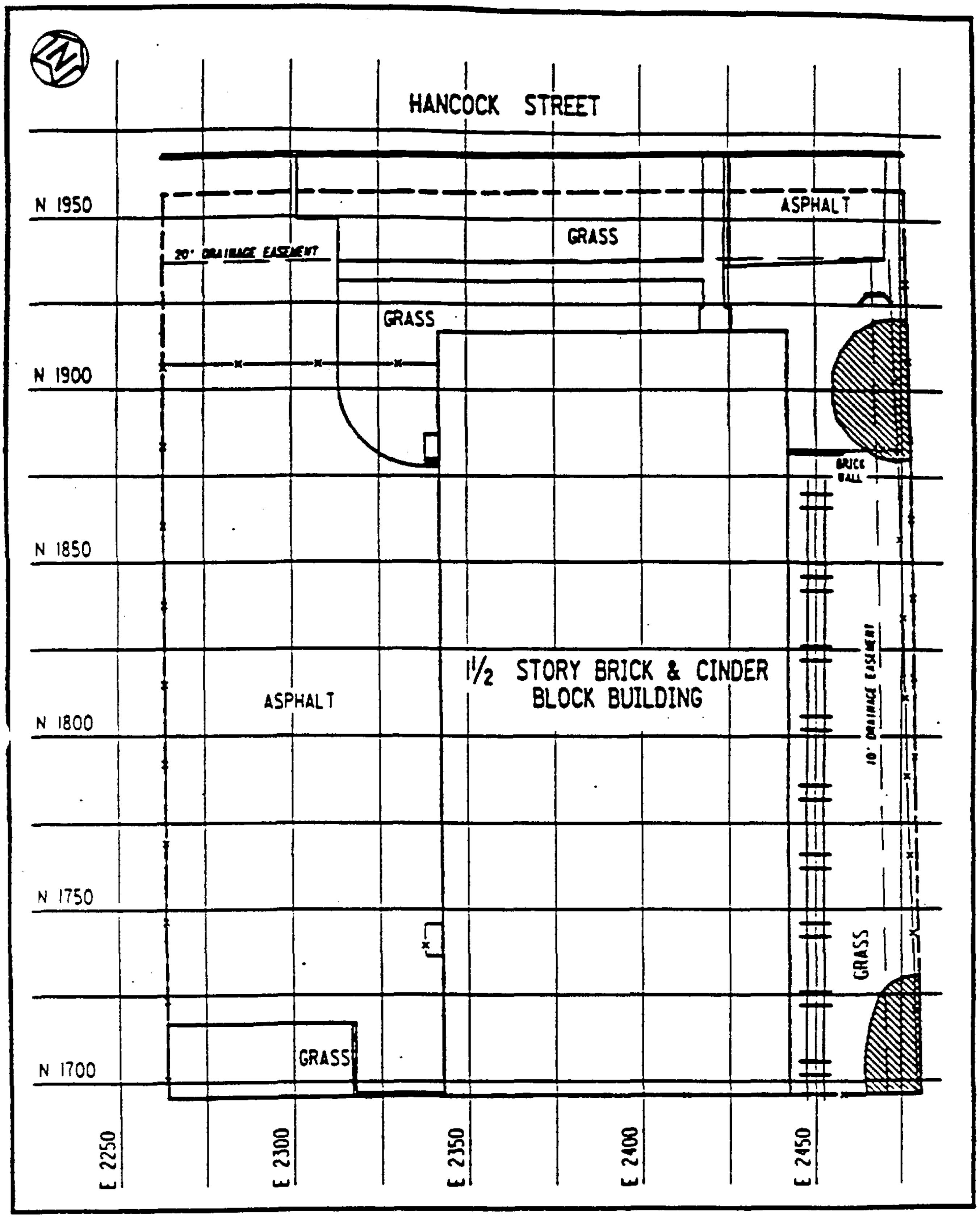

FIGURE 5-1 AREAS OF SURFACE CONTAMINATION AT 100 HANCOCK STREET

M38V9857.DGN

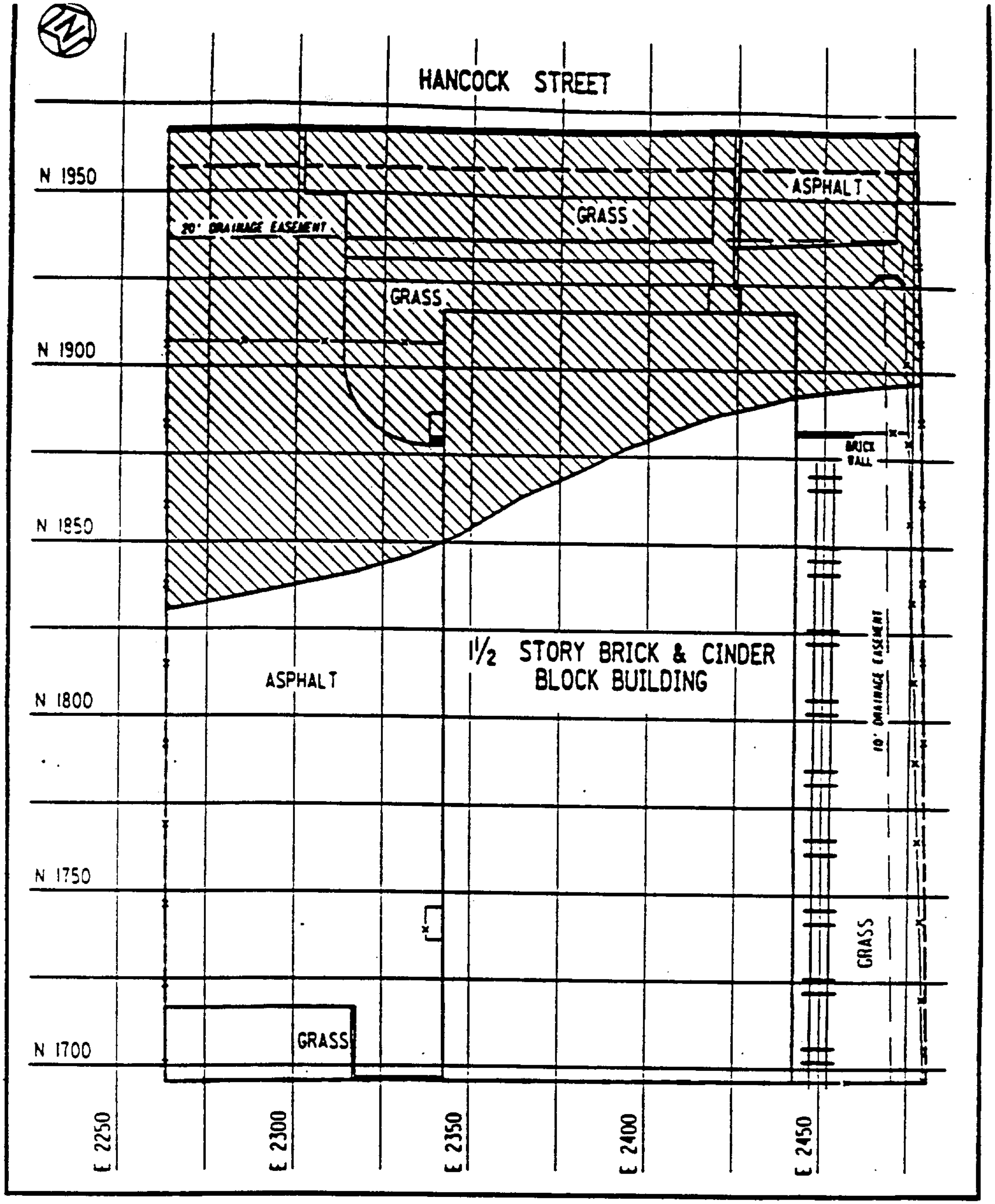

FIGURE 5-2 AREAS OF SUBSURFACE CONTAMINATION AT 100 HANCOCK STREET

M38V9857.DCN

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

80 INDUSTRIAL ROAD

A. Description of Property

A commercial property is located at 80 Industrial Road. The property covers approximately 3.6 acres (15,000 m^2). A cinder block building covers one quarter of the property, approximately 43,000 ft^2 (4,000 m^2). There is an asphalt-paved parking lot along the western side and an asphalt-paved parking/loading area along the eastern side of the property. The entrance or north side of the building is bordered by a grassy area, and the rear or south side of the building is bordered by a grassy area that adjoins a state-operated property, the New Jersey Vehicle Inspection Station (another Phase II property). The area is primarily residential with a small industrial section. The former property owner, Flint Ink, no longer operates this facility and in 1994, the property was listed for sale. When operated by Flint Ink, the facility produced various types of ink used in the printing industry and employed approximately 45 to 50 people. At the time, the building contained an office area, laboratory, lunchroom, shower facilities, and a large manufacturing area. The property is currently owned and operated by American Jewel Windows Corporation. Commercial activity on the site includes new auto storage and materials storage. The parking lot on the west side of the building is rented to a Volvo dealer for storage of approximately 75-100 vehicles. The eastern parking lot is an employee parking lot and contains space for about 25-30 cars. A buried conduit containing the present-day channel of Lodi Brook runs parallel to Hancock Street through this property. Prior to realignment during property development, Lodi Brook was thought to run across the property in a southwesterly direction through the area where the building now stands. This former channel is the suspected transport mechanism for the radiological contamination found at the site. The owner has plans to expand (three 10,000 square feet units) once remediation is complete and restoration is underway.

B. Site-Specific Geology

A general soil description, taken from on-site soil boring logs, is as follows: approximately 5 to 6 ft of gravely, silty fill is underlain by interbedded silts, clays and sands, approximately 6 ft in thickness. Weathered bedrock is reported in one boring location at 12.9 ft. (northeastern corner of the property). One boring location in the northwestern portion of the site shows interbedded silts, clays and sands to a depth of 23 ft where the auger met refusal. The silts and clays are organic in nature and contain plant fragments. Beneath the silts and clays, there are sand deposits, approximately 12 ft thick, reddish brown in color, fine to coarse-grained, fining upwards, with low density plant material. At 15.5-16 ft, the sand is coarse-grained and contains gravel. These are former Lodi Brook channel sand deposits.

C. Site Specific Geophysical

D.

No geophysical information was located.

D. Site-Specific Geotechnical

No geotechnical information was located.

E. Site-Specific Hydrogeology

Boring logs for 80 Industrial Road (Document # M-074) show that depth to water table ranges from 4 to 9 ft over the entire site.

F. Civil/Survey Information

No survey information was located.

G. Underground Utilities

No utility information was located.

H. Previous Investigations (Radiological)

Radiological characterization data published in M-711, Results of the Radiological Survey at 80 Industrial Road (ORNL/RASA-88/17) and M-074, Radiological Characterization Report For The Commercial Property At 80 Industrial Road (DOE/OR/20722-252) by Bechtel National, Inc. (BNI) were evaluated. The reports suggest a fairly contiguous subsurface layer of contamination which extends from the northern end of the property, beneath and adjacent to the building (to the west), extending behind the building to the south. This can be seen on the attached figures.

The property was scanned with an unshielded gamma scintillation detector. Cone-shielded measurements were also taken to help define the limits of contamination. Exterior exposure rates ranged from 5 - 21 μR/h. The majority of the property had exposure rates which ranged from 5 - 13 μR/h.

Soil samples were collected from the surface and from within boreholes. Thorium-232 maximum concentrations of 48 - 64 pCi/g were found in soil extracted from 6 - 7 feet below the ground surface (ORNL report). BNI reported surface and subsurface maxima of 15 pCi/g and 28.8 pCi/g, respectively. Radium-226 concentrations were much lower and in almost all samples did not exceed 10 pCi/g.

Approximately 65 boreholes were installed and gamma logged during the two investigations. Count rate data indicated varying depths of contamination with approximately 35 percent of the areal extent of the property affected. In some boreholes, contamination extended to only 0.5 feet while in others the depth of contamination was approximately 6 feet. In the scope of work prepared for the field demonstration project, the ACE estimated 687 cubic yards of contaminated material on the property.

I. Previous Investigations (Environmental)

No environmental investigation information was located for the 80 Industrial Road property. However, the facility is listed in EPA's Facility Index System database (FINDS) which notes that the facility was a hazardous waste generator during Flint Ink's operation of the site circa 1980. EPA ID is listed as NJD002139145. EPA records also indicate that the facility was listed in CERCLIS and RCRA Information System (EDR Report). A violation was issued in 1985 (Generator-all requirements). An enforcement action was written (Initial Formal 3008(a) Compliance Order) and a monetary fine paid. The facility is also listed under Corrective Actions (CORRACTS). In a second EDR Report, the site is listed as a state hazardous waste site (SHWS). The status date is given as 07/28/95.

J. Summarize Data Gaps

Pilot Study Data Gaps:

Radiological - The contamination on the property forms a contiguous layer, much of which extends beneath the building located on the central portion of the property. Based on the existing data, it is quite possible that sufficient volumes of contaminated soil in outdoor areas are not easily accessible. Therefore, this property is not a viable candidate for use in the pilot study.

Design Data Gaps:

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Civil/Survey Data - Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Work Plan.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: American Jewel, Flint Ink (formerly)

Property Address: 80 Industrial Road

County/State: Lodi, New Jersey

Property Use:

Company Name: American Jewel Windows Corporation

Company Contact Name : Joel Cuccio

Company Contact Address/Phone No.:
(973) 773-0550

Current Property Use: Auto storage and material storage

Hours of Operation: 6:30 am- 5:00 pm, M-F, and 8:00 am - 1:00 pm, Saturday

Past Uses: Flint Ink manufactured and distributed inks used in printing operations.

Property Description:

Lot Size: 3.6 acres

No. of Buildings : One

Building(s) size (each): 43,000 ft^2

Year built: Unknown

Zoning: Commercial

Uses of Adjacent Properties:

North:	CGI Industries, formerly Airco Medical/Welding, 80 Hancock St
East:	Commercial ?, Gregg Street
South:	Industrial-New Jersey Vehicle Inspection Station
West:	Residential, Hancock Road

Nearest structure on adjacent properties and each side of site boundary:
Commercial building
Commercial building
Industrial building
Residential housing

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: Unknown
Equipment ID No.:
Installation Date:
Labels:
Fluid volume:

Is there any secondary containment?

Is any of the equipment leaking or damaged? If so, describe:

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? ______

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? ______

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:
Auto storage and material storage - Unknown

Were there past operations conducted on the property that required the use of USTs? If so, describe: Ink manufacturing -
Unknown

Are there any USTs removed from service, but left in the ground?

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).

Any history of leak or discharge from ASTs?

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: ______________________________

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
NA

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Property Owner
Foundation Drawings			Potentially from property owner
Loading & Foundation Design Dwgs.			Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification	x		PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction			PDI Investigation
Specific Gravity			PDI Investigation
Consolidation			PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

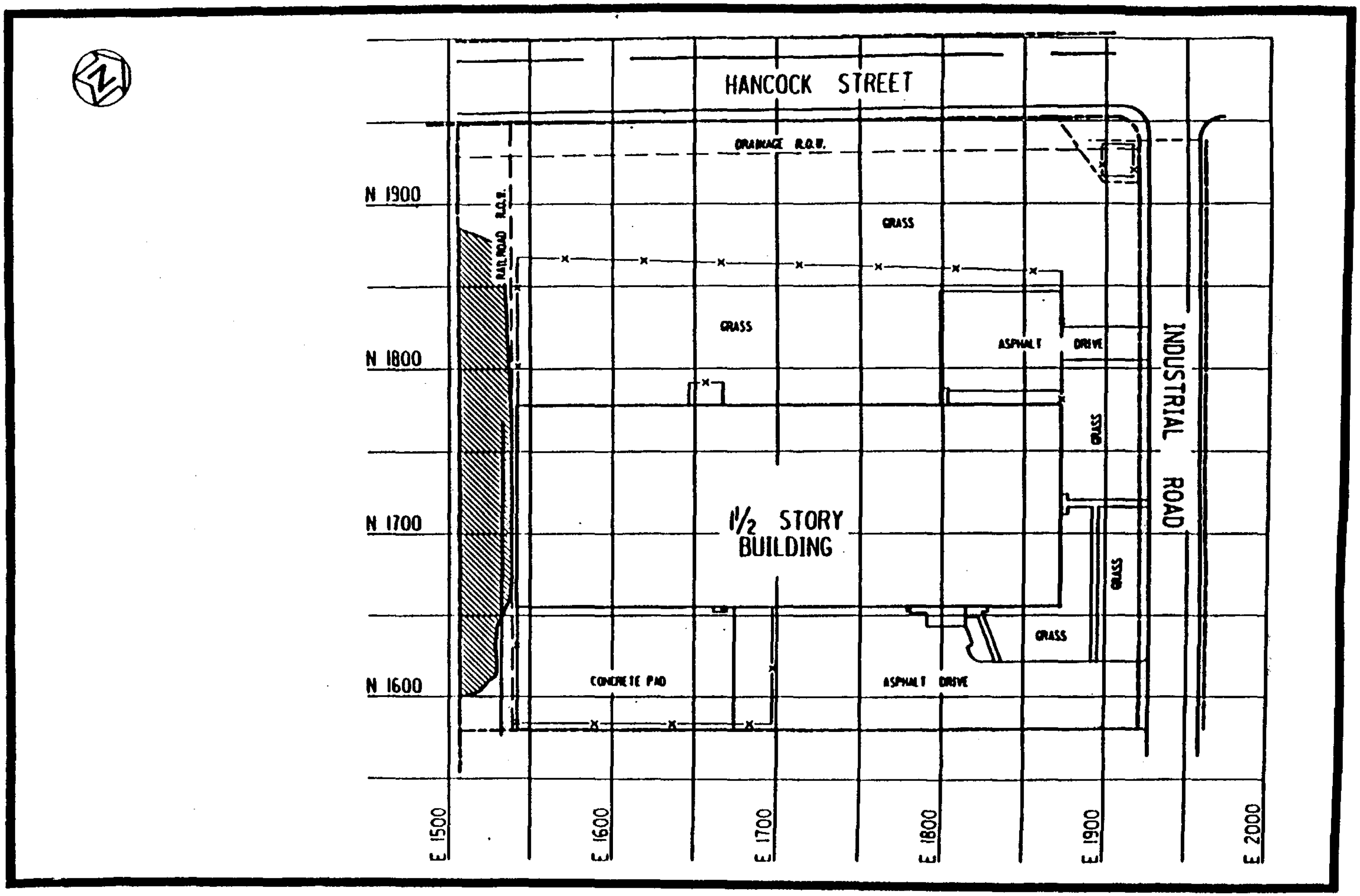

FIGURE 5-1 AREAS OF SURFACE CONTAMINATION AT 80 INDUSTRIAL ROAD

M30W9049.DGN

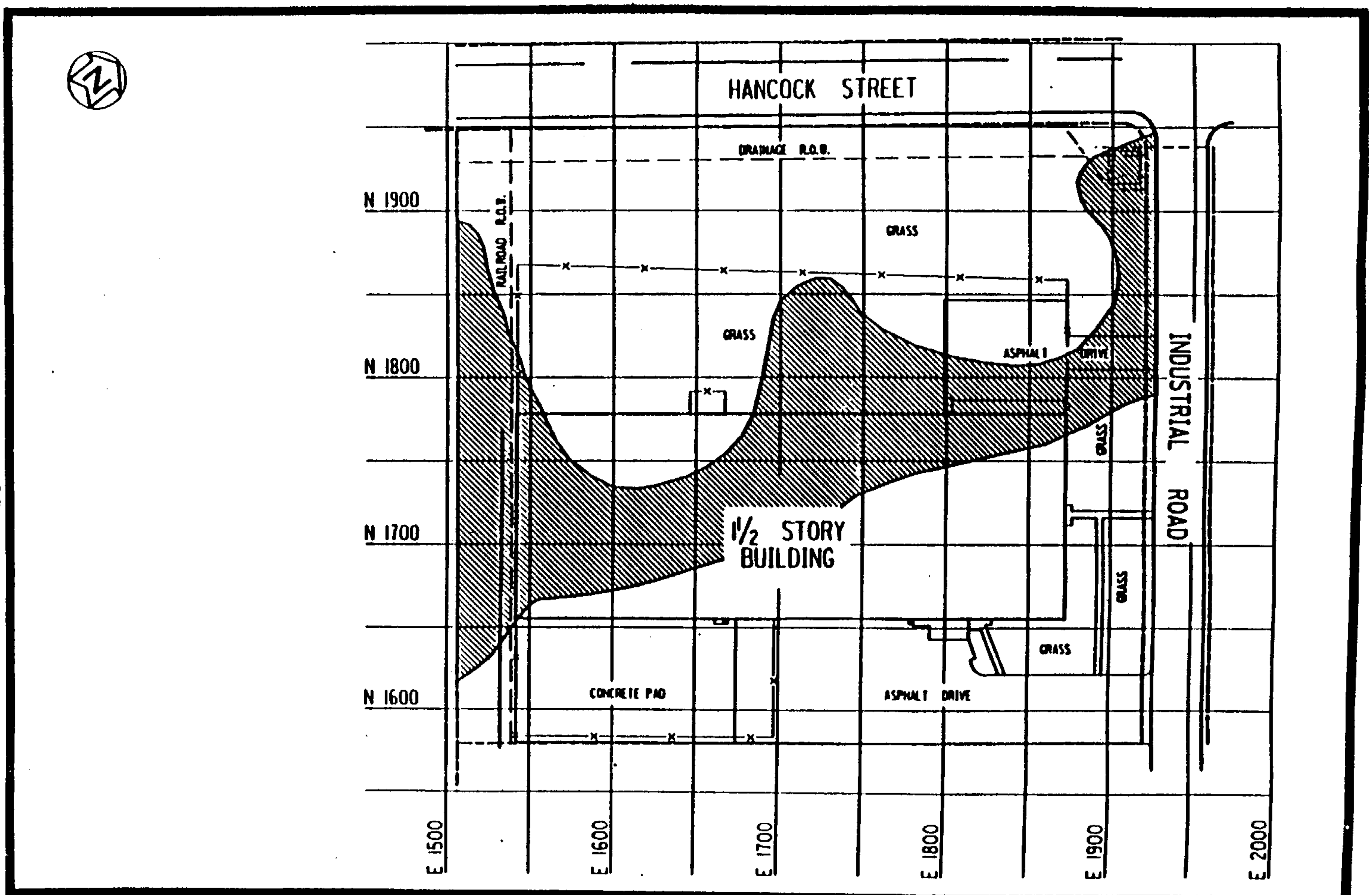

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FIGURE 5-2 AREAS OF SUBSURFACE CONTAMINATION AT 80 INDUSTRIAL ROAD

N38W9849.DGN

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

NEW JERSEY MOTOR VEHICLE INSPECTION STATION

A. Description of Property

The New Jersey Motor Vehicle Inspection Station (NJMVIS) is located at 8 Mill Street in Lodi, Bergen County, New Jersey. The site encompasses approximately 14.5 acres. It is bordered on the northeast by the 80 Industrial property (Flint Ink) and by another unnamed property, on the southwest by the entire length of Columbia Lane, on the southeast by Gregg Street and on the northwest by Hancock Street and residential homes.

A building (Inspector Station) and pavement cover most of the property. The building is a one-story cinder block building (approx. 20,000 sf) that houses offices for the NJMVIS personnel. The Inspection Station serves three roles. The motor vehicle bureau handles titles, licenses, and registration. The Department of Transportation gives written and driving tests, and Parsons Technology runs the state vehicle inspection program. The west side of the site and the western portion of the building is used for vehicle inspections. Ten to fifteen people are employed for inspections and work mainly outside in the inspection bay. The rest of the site and the northeast portion of the building are used for licensing and driver testing. The licensing and driver testing division of the NJMVIS employs 15 to 25 people. Primary access to the building is via the northern side of the building. Typically, several hundred people are present on the site daily, both inside and out for vehicle inspections, licensing and driver testing.

Drawings included in the ORNL radiological survey completed on Aug. 22, 1984 (M-737) indicate that the site has been substantially altered over time; a road was filled in, a new road built, the north area paved, and possibly three former buildings were demolished and a new building built. It is not known if the site was previously used by NJMVIS for other purposes.

In the north portion of the site, immediately south of the berm (driver's education road), the drainage system is ineffective and the soil was nearly saturated with groundwater during a characterization performed in June 1987.

Given the large transient population at the station and the numerous groups that informally use (without permission) the open site area in off-hours, safety during excavation and remediation is a priority. A Right-of-Entry agreement has been signed for this property.

B. Site-Specific Geology

The topography is essentially flat. A three-foot high berm exists in the northern portion of the property in the driver's education area, the purpose of which is unknown. Cross-sections of the former Lodi Brook, positioned northeast and southwest of the NJMVIS site, indicate that the pedology of the area includes urban fill ranging from 0 to 6 feet thick, overlying a silty-sand about 5 feet thick, overlying about 8 to 9 feet of natural undisturbed sediments and weathered bedrock. The top of bedrock is estimated to lie 15 to 20 feet below grade (bg). Eighty-nine boreholes were placed around the site. The boring logs show that the boreholes were only completed to 10 feet below grade, possibly due to reaching groundwater, and thus it is not known what type of material the bedrock is. (M-597) Other reports (M-119) state that the bedrock is sandstone of the Brunswick Formation and ranges from 6 to 20 feet below grade on the southeast, and central & northwest portions of the site, respectively.

Areas with thick accumulations of fill include the berm adjacent to the driver testing road (6 feet), the former Lodi Brook channel (6 feet), the current Lodi Brook conduit (5 - 7 feet), and the drainage pipes around the property which generally drain from north to south on the north side of site (5 feet).

C. Site Specific Geophysical

No geophysical surveys were found.

D. Site-Specific Geotechnical

No geotechnical laboratory information was found.

E. Site-Specific Hydrogeology

Ground water levels in the north and east property site range from 6 to 8 feet, while the mid-property water levels have been documented at depths of greater than 10 feet. This suggests a northeast to southwest gradient (M-119). No other hydrogeology information was found.

F. Civil/Survey Information

At this time, no civil/survey information has been collected.

G. Underground Utilities

A data search by EDR dated December 1998 indicates that a 5,000 gallon UST was installed in 1961 on the site to store No. 2 diesel fuel. The tank is constructed of steel. No known underground utilities in the affected area are identified; no overhead interferences seen (Proposal).

H. Previous Investigations (Radiological)

Radiological data from DOE/OR/20722-153, Characterization Report For The New Jersey Vehicle Inspection Station Property (M-119) were evaluated. These consisted of outdoor exposure rate measurements with a 2" x 2" sodium iodide coneshielded gamma detector, surface soil radionuclide concentration data generated from 53 samples (thorium, radium and uranium), and downhole gamma count rate data.

Surface exposure rate data were not provided. The authors noted that the data were used to select borehole locations in potentially contaminated areas. The soil sample data indicated relatively low levels of contamination in the affected areas; the maximum ^{232}Th and ^{226}Ra concentrations were only 12.5 pCi/g and 1.7 pCi/g, respectively.

Borehole coverage was fairly comprehensive in the two areas identified with elevated concentrations of radionuclides of concern. These areas can be seen on the attached figures. A total of 113 boreholes were installed and gamma logged. The largest area was located in the north/northeast portion of the property, coinciding with the location of the original Lodi Brook and current conduit. A smaller area of contamination was identified in the southern portion of the property. The authors noted that the gamma logging data indicate contamination extending to depths which ranged from 1 - 7 feet below the ground surface in the larger area to the north; contamination in the southernmost affected area was limited to the top 1 - 2 feet.

Radiological data were also collected inside the building located on the property. Radon concentrations ranged from less than 0.2 - 0.8 pCi/L. Radon decay product concentrations were also quite low, ranging from 0.0006 - 0.001 WL. Thoron decay product concentrations were less than 0.003 WL. Indoor exposure rates ranged from 4 - 5 μR/h.

I. Previous Investigations (Environmental)

According to the EDR Report, the facility is listed in a county/local unique database (LOCAL) under NJ RELEASE. A diesel fuel release occurred at the facility on 07/19/93. A saddle tank fell off a truck causing a spill of 50 gallons approximately. The spill was subsequently cleaned up.

J. Summarize Data Gaps

Pilot Study Data Gaps:

Historical - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil to be acquired for the pilot study.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for the pilot study for this site include laboratory data needed for design of the soil washing system.

Hydrogeological Data - Some site-specific hydrogeological data is available; however, it does not constitute a site-wide hydrogeological characterization. It may be necessary to obtain additional hydrogeological data in order to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - The existing data indicate that sufficient quantities of low to moderately contaminated soil are present in the north/northeast portion of the property. Radionuclide concentrations in this area appear to be near or just slightly greater than the cleanup levels established for the site, making them suitable for use in the pilot study.

Environmental Data - Some chemical data exists for site soil and groundwater; however, this data is not sufficient to characterize site soils and groundwater for pilot study (including disposal) and health and safety purposes.

Design Data Gaps:

Historical - See Pilot Study Data Gaps.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Geophysical Data - See Pilot Study Data Gaps.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - See Pilot Study Data Gaps.

Civil/Survey Data - See Pilot Study Data Gaps.

Underground Utility Data - See Pilot Study Data Gaps.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - Some chemical data exists for site soil and groundwater; however, this data is not sufficient to characterize site soils and groundwater for remedial design (including disposal) and health and safety purposes.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: New Jersey Motor Vehicle Inspection Station (NJMVIS)

Property Address: 8 Mill Street; Gregg Street-Columbia Lane, Lodi, NJ

County/State: Bergen County, New Jersey

Property Use:

Company Name: NJMVIS

Company Contact Name :Raymond Herr (MV Bureau), 2 contacts (unknown) for Parsons and driving inspectors (State Union employees).

Company Contact Address/Phone No.: (973) 916-2603

Current Property Use: Activities include queuing of vehicles for inspection, driver testing road area, inspection bays, administration building, and employee & customer parking (Proposal)

Hours of Operation: Parsons – 8:00 am-5:30 pm, M-F, 8:00 am-12:00 pm, Sat.
MV Bureau – 8:00 am-4:30 pm, M-F

Past Uses: Drawings included in the ORNL radiological survey completed on Aug. 22, 1984 (M-737)indicates that site was different than today; a road was filled in, a new road built, the north area paved, and possibly the existing 3 buildings demolished and a new building built. Unknown if site was previously used by NJMVIS as inspection station or other purposes .

Property Description:

Lot Size: 1,155 feet by 495 feet (approx. 13.125 ac) (source: document M-597)

No. of Buildings : One

Building(s) size: 180 feet by 35 feet (approx. 6,300 sf) (M-597)

Year built: Between 1956 and 1978 (M-597)

Zoning: Commercial

Uses of Adjacent Properties:

Northeast: 80 Industrial (Flint Ink) and another commercial site, name unknown.
Southeast: Gregg Street
Southwest: Columbia Lane
Northwest: Single and multiple family homes along Hancock Street

Nearest structure on adjacent properties and each side of site boundary:
Commercial building
Commercial
Residential housing
Residential housing

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property?

Type of equipment: Unknown
Equipment ID No.:
Installation Date:
Labels:
Fluid volume:

Is there any secondary containment?

Is any of the equipment leaking or damaged? If so, describe:

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property?

	Tank 1	Tank 2	Tank 3
Tank capacity:	5,000 gallons		
Substance Stored:	No. 2 Diesel		
Installation Date:	1/1/1961		
Registration (Y/N)	Yes		
Single or double-walled			
Corrosion protection	No		
Leak detection tests (Y/N)	Unknown		
Results of testing:			

Any known history of leaks ? ______

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:

Were there past operations conducted on the property that required the use of USTs? If so, describe: ______

Are there any USTs removed from service, but left in the ground?

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).

Any history of leak or discharge from ASTs?

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities:

Describe condition of containers (is there any corrosion or leakage?)

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Hazardous Waste Storage and Disposal

EPA Identification number for site: ______________________________

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste

(Includes biological or medical)

________________	________	________________
________________	________	________________
________________	________	________________
________________	________	________________
________________	________	________________
________________	________	________________
________________	________	________________
________________	________	________________
________________	________	________________

Describe condition of hazardous waste containers (is there any corrosion or leakage?)

____

____

____

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

____

____

____

____

Water and Wastewater

Are there any sanitary or septic system on the site?
Area is quite developed; most likely wastewater handled by city treatment plant.

Note source of water for the site, and identify on-site wells
Area is quite developed; most likely water is from city water treatment plant.

Note if site falls within floodplain, describe direction of runoff.
North portion of site falls within the floodplain of the Former Lodi Brook.

Note if any water quality data is available for on-site wells.

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	EDR INC.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Property Owner
Foundation Drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction			PDI Investigation
Specific Gravity			PDI Investigation
Consolidation			PDI Investigation
Hydrogeologic Investigation:			
Depth to Water			Generically via boreholes for down gamma testing
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

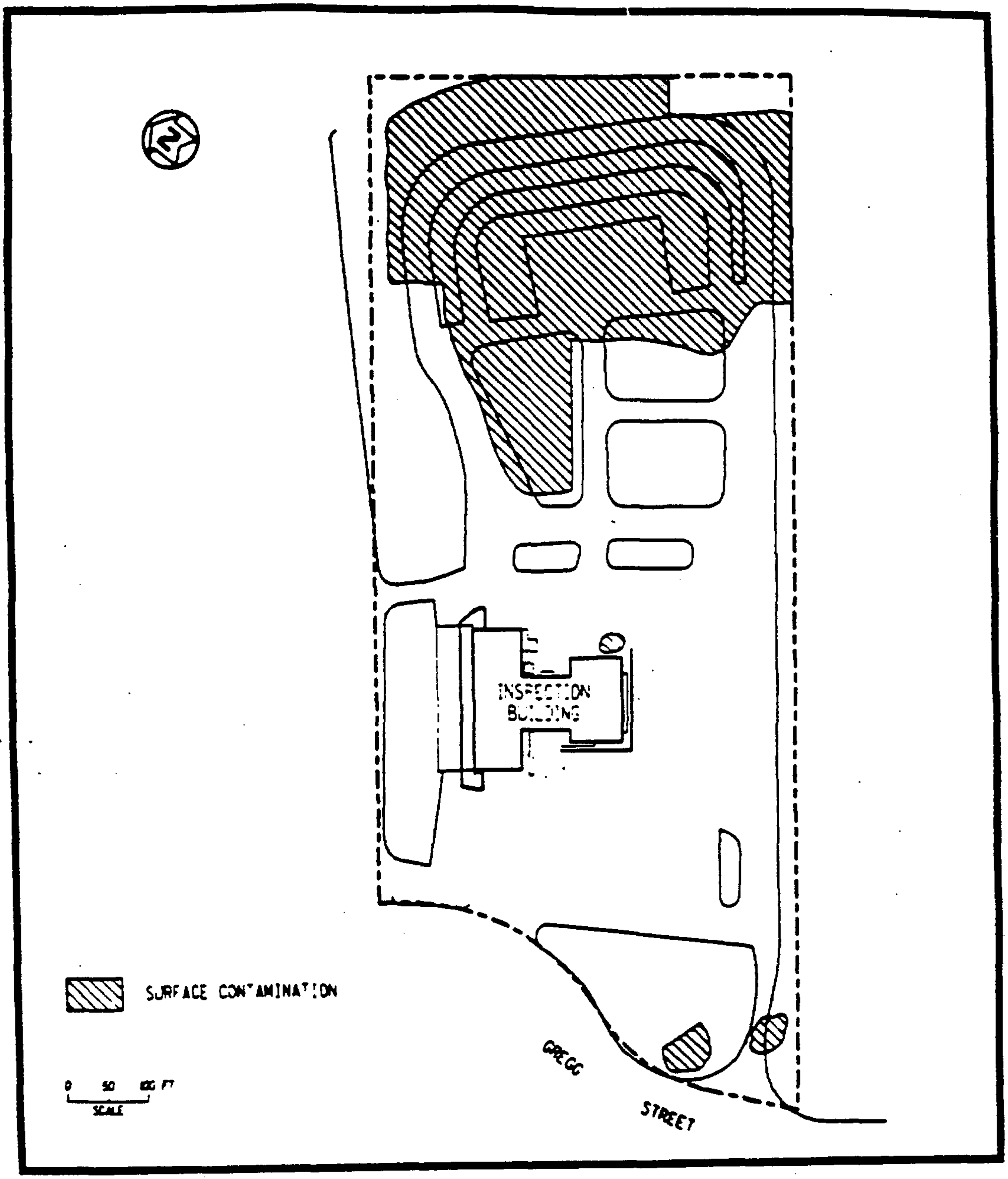
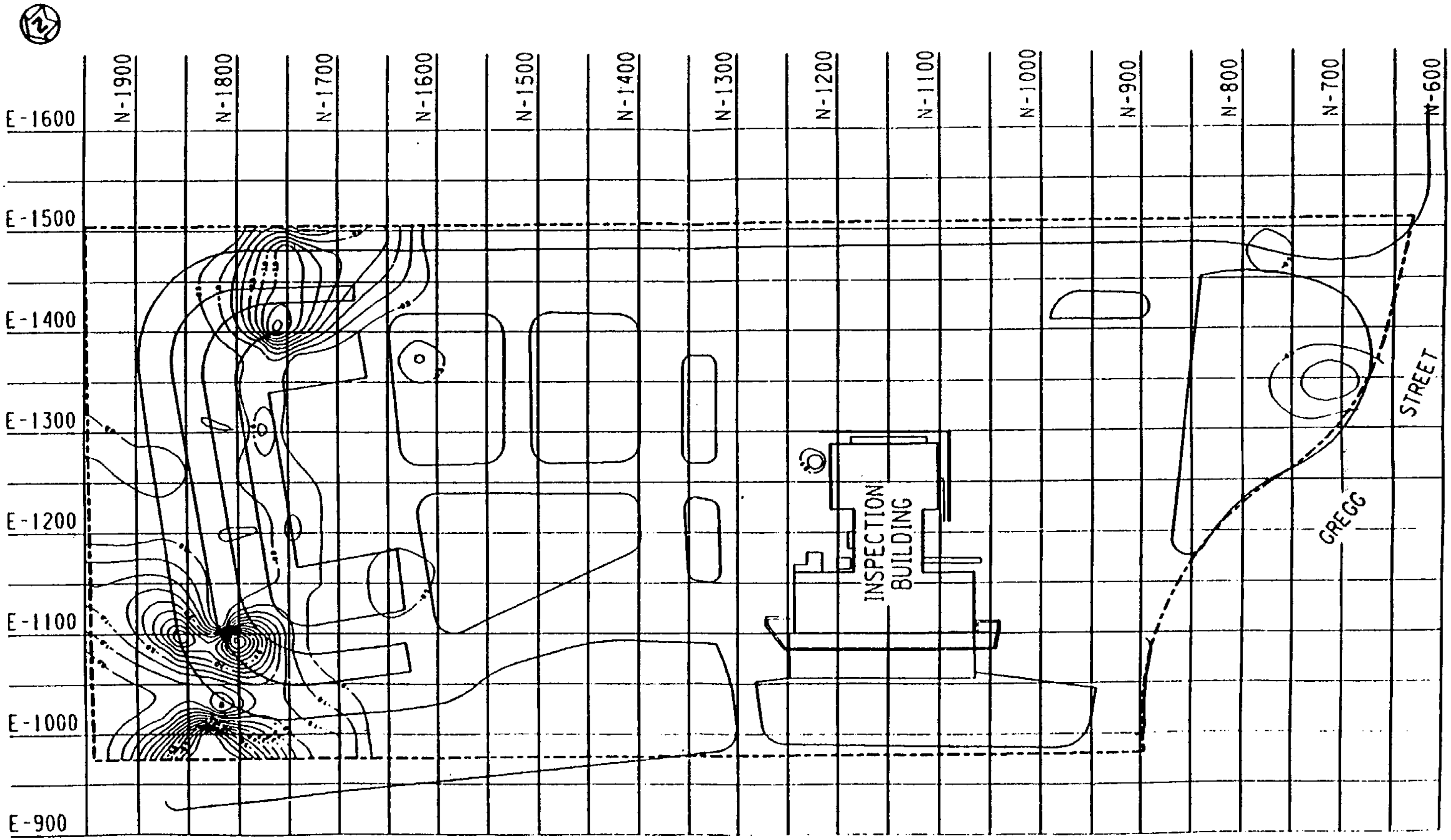


FIGURE 3-2 AREAS OF SURFACE CONTAMINATION AT THE NEW JERSEY VEHICLE INSPECTION STATION PROPERTY



NOTE: ALL DEPTHS ARE INDICATED IN FEET ON CONTOUR LINES

Property Cluster No. 3

- 170 Gregg Street (Bergen Cable)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

170 GREGG STREET (Bergen Cable)

A. Description of Property

Bergen Cable is located at 170 Gregg Street in Lodi, New Jersey. The property is approximately 130,000 square feet with a partially paved area in front and gravel and grass covering the remaining area. There is one building on the property, which is 74,250 square feet constructed of cinder block with brick veneer. It is divided into several sections and contains offices for clerical, engineering, sales and other staff as well as fabrication, quality control testing, maintenance, warehouse, and miscellaneous storage areas. The facility operates 5 days a week, 8 hours per day (M-116). There are approximately 35 to 40 employees at the facility that are engaged in the fabrication and sales of steel cable for industrial use. The fabrication process includes the winding of various types of steel cable varying in size and tensile strength. After the wire has been twisted into cable, the wire cable is then machine wound into various thicknesses and wound onto large wooden spools (M-736).

B. Site-Specific Geology

There is no site-specific geologic information for this property.

A general stratigraphic description of the area is as follows:

"The area is located within the Piedmont Physiographic Province, also known, in New Jersey, as the Newark Basin. It consists of sandstones, shales, mudstones and conglomerates covered with unconsolidated materials consisting of fill, recent deposits, glacial stratified and unstratified deposits, and soil residual" (M-575).

C. Site Specific Geophysical

There is no site-specific geophysical information for this property.

D. Site-Specific Geotechnical

There is no site-specific geotechnical information for this property.

E. Site-Specific Hydrogeology

There is no site-specific hydrogeologic information for this property.

F. Civil/Survey Information

There is no site-specific civil/survey information for this property.

G. Underground Utilities

There is no site-specific underground utility information for this property.

Previous Investigations (Radiological)

The initial radiological characterization was performed in 1984 by Oak Ridge National Laboratory (ORNL). The data from that effort are provided in Results of the Radiological Survey at 170 Gregg Street, Lodi, New Jersey (M-736, ORNL/RASA-84/LJ1, October, 1984). A surface gamma scan identified elevated exposure rates in three distinct portions of the grass and gravel covered northeast portion of the property. A maximum exposure rate of 110 µR/h was recorded. Two biased surface soil samples collected from those areas had ^{232}Th, ^{226}Ra, and ^{238}U concentrations of 140 and 4.4 pCi/g, 29 and 1.8 pCi/g, and 43 and 1.6 pCi/g, respectively.

The Radiological Characterization Report for Bergen Cable in Lodi, New Jersey is a letter report prepared by Bechtel National Inc. (BNI) dated February 28, 1987. It describes their investigation, which consisted of outdoor exposure rate measurements with a 2 inch x 2 inch sodium iodide coneshielded gamma detector and collection of surface and subsurface soil for thorium, radium and uranium analysis. Boreholes were installed and downhole gamma count rate data were collected.

BNI confirmed the same affected areas as the earlier investigation (shown on the attached figure), although the north arrow on their map was opposite than that presented by ORNL. BNI identified the surface contamination in the southern part of the property and in addition, found contamination in the southeastern corner of the property. They also recommended additional investigation of the drainage ditch located on the east side of the property.

Three surface soils contained elevated concentrations of radionuclides of concern, with a maximum ^{232}Th concentration of 72 pCi/g. Downhole gamma logging was performed in 41 boreholes to depths of up to 8 feet. BNI concluded that no subsurface contamination was evident, which they define as having thorium and radium concentrations which exceed 15 pCi/g (commercial cleanup criteria). However, the residential cleanup criteria of 5 pCi/g for the sum of ^{226}Ra and ^{232}Th is appropriate for this property.

Document M-698 contains indoor radon and exposure rate data collected at this property. Twenty-five radon samples were collected; radon concentrations ranged from 0.2-0.4 pCi/L. Interior and exterior exposure rates were in the range due to natural background.

I. Previous Investigations (Environmental)

The facility has reported leaking underground storage tank incidents and is listed in the Leaking Petroleum Storage Tank Database (LUST). The site was issued a Letter of No Further Action. A UST was recently removed from the site. The facility is also listed in the RCRIS database as a generator of hazardous waste (1985). EPA records indicate that the site is also listed in its FINDS database in the Permit Compliance System and RCRA Information System.

J. Summarize Data Gaps

Historical Data- Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geological Data - No site-specific geological data is available. Geologic data is required to quantify volumes of fill/soil for site remediation design.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Work Plan.

References

M-116, Radiological Characterization Report for Bergen Cable in Lodi, New Jersey, Bechtel National, August 1986.

M-575, Final Remedial Investigation Report Stepan Company Property, Maywood, New Jersey, CH2M Hill, November 1994.

M-698, Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site, Bechtel National, Inc., August, 1994.

M-736, Results of the Radiological Survey at 170 Gregg Street (LJ001), Lodi, New Jersey (Administrative Record for the Maywood Site, New Jersey), Oak Ridge National Laboratory, October 1984.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Bergen Cable

Property Address: 170 Gregg Street

County/State: Lodi, New Jersey

Property Use:

Company Name: Bergen Cable

Company Contact Name : Mr. Edward Hogan (counsel)

Company Contact Address/Phone No.: (973) 889-4212

Current Property Use: Fabrication and sale of steel cable for industrial use

Hours of Operation: 5 days a week, 8 hours per day

Past Uses: Unknown

Property Description:

Lot Size: 130,000 ft^2

No. of Buildings :One

Building(s) size (each): 74,250 ft^2

Year built: Unknown

Zoning: Commercial

Uses of Adjacent Properties:

Uses of Adjacent Properties:

North:	NJDOT
East:	Residential
South:	80 Industrial Rd & NJVIS
West:	100 & 180 Hancock Street

Nearest structure on adjacent properties and each side of site boundary:
North - NJDOT: Structures unknown
East - Residential housing
South - Commercially used buildings
West - Commercially used buildings

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ______
Equipment ID No.: ______
Installation Date: ______
Labels: ______
Fluid volume: ______

Is there any secondary containment?
Unknown

Is any of the equipment leaking or damaged? If so, describe: Unknown

Is there any known history of leaks or discharges?
Unknown

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? One-removed

	Tank 1	Tank 2	Tank 3
Tank capacity:	Unknown		
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Straw and gravel now cover the area where the tank was located.

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:

Were there past operations conducted on the property that required the use of USTs? If so, describe:

Are there any USTs removed from service, but left in the ground?
Unknown

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).

Any history of leak or discharge from ASTs?

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: ______________________________

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste

(Includes biological or medical)

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
Unknown

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	PDI Investigation
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	Groundwater Investigation
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

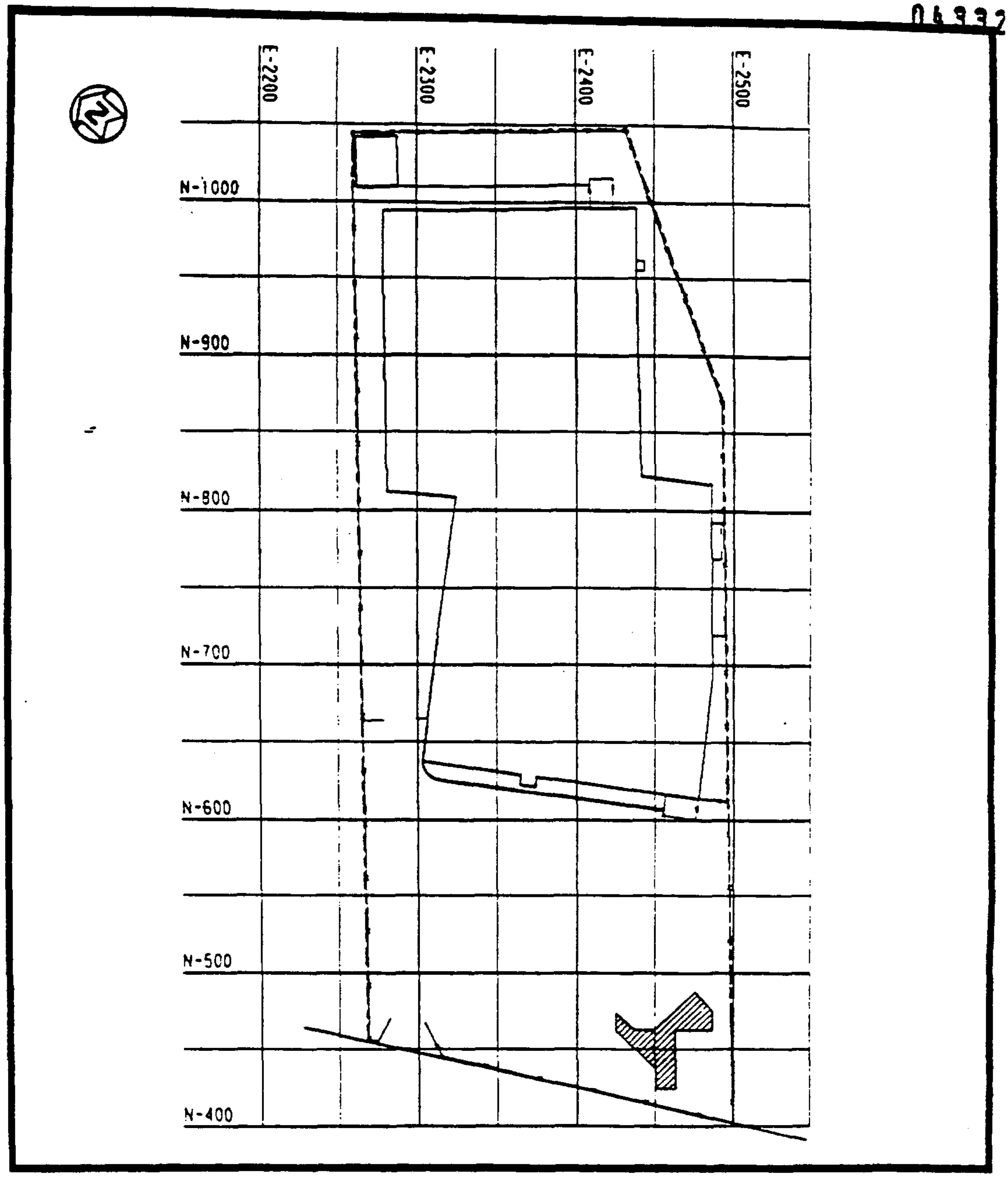


FIGURE 3 AREA OF SURFACE CONTAMINATION AT BERGEN CABLE

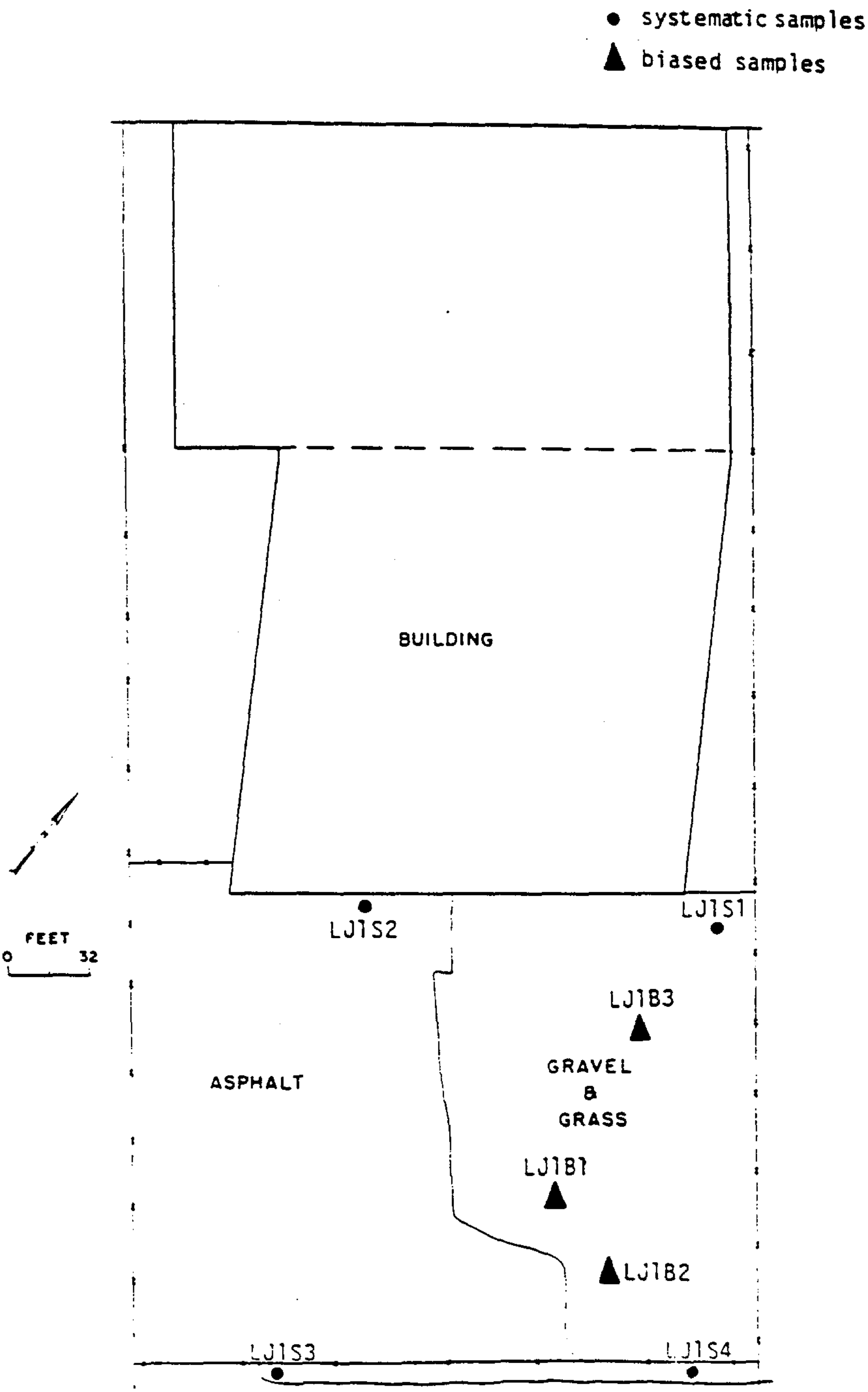


Fig. 1. Diagram showing locations of soil samples taken at 170 Gregg Street.

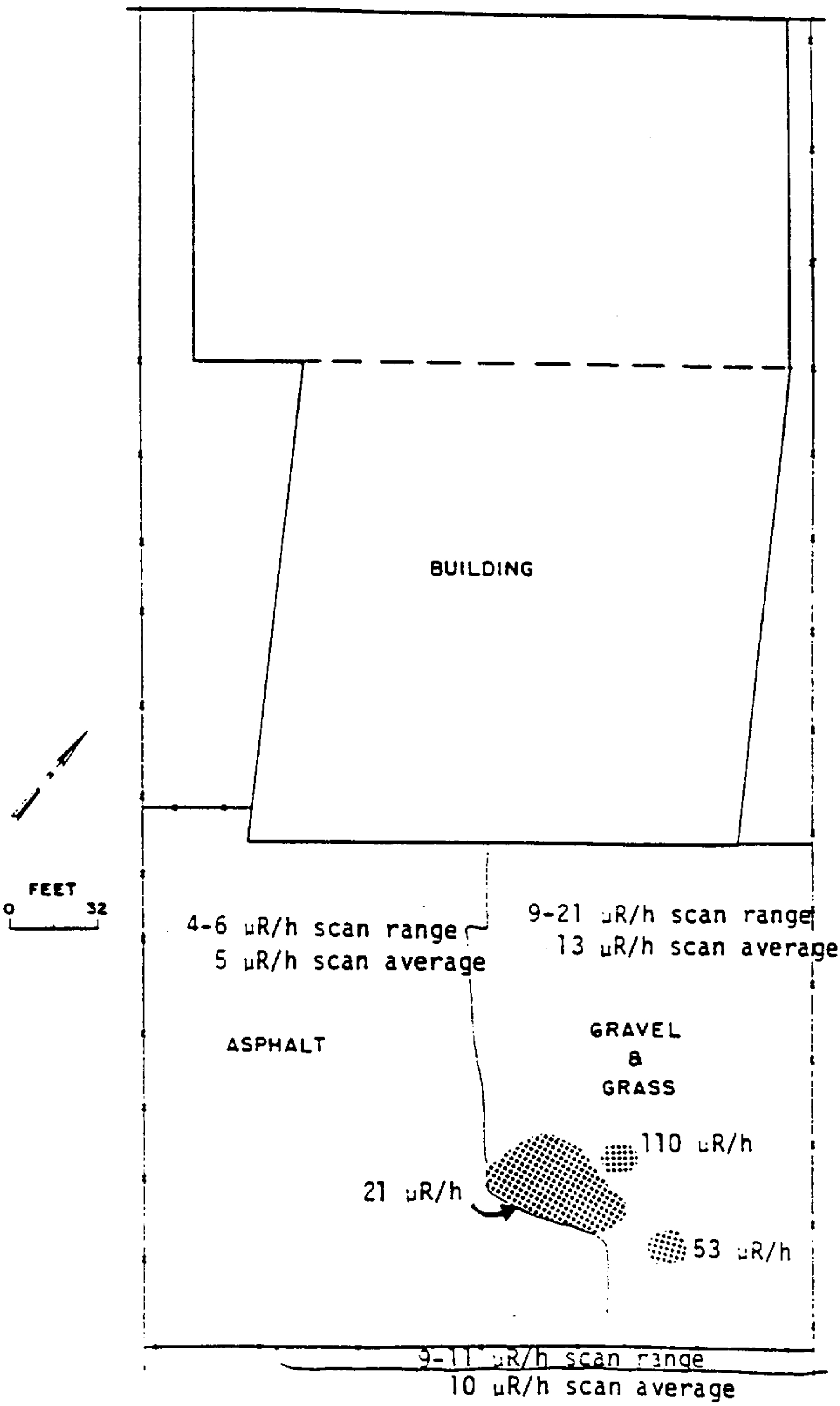


Fig. 2. Location of elevated gamma radiation levels at 170 Gregg Street.

Property Cluster No. 4

- 160/174 Essex Street (Bank of New York)
- I-80 Westbound Right-of-Way

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

160/174 ESSEX STREET (National Community Bank)

A. Description of Property

The 160/174 Essex St. National Community Bank property, situated in a heavily commercialized area along Essex St in Lodi, was purchased by the Bank of New York in 1994. The property at 160 Essex St. is a partially paved parking lot and is located adjacent to the 174 Essex St. property. The only buildings on these properties are a single-story stucco office building, surrounded by an asphalt paved area, and a small storage building located at the rear of the property at 174 Essex St. The office is occupied by less than twenty people and the facility is operational 5 days per week. A Military Reserve Facility lies to the east of the property, to the west and north, commercial properties (113 Essex St. Property and Route 17S and Essex St. Property), and to the south, I-80. A below grade culvert (the Lodi Brook Culvert) transects the property from Essex St. to the aboveground exposed Lodi Brook near the I-80 Westbound Right-of-Way.

B. Site-Specific Geology

The 160/174 Essex St. site is located in northeastern New Jersey within the glaciated section of the Piedmont Plateau. The topography is level with minor relief. Site-specific geologic information was collected by Bechtel National, Inc. (BNI) in 1987 (Document # M-075).

Stratigraphy at the site consists of unconsolidated sands, silts and gravel underlain by bedrock; the New Brunswick Sandstone. The uppermost layer is a silty gravel fill, ranging in thickness from 0.3 ft to 5.7 ft below grade throughout the site. The gravel is a broken basalt gravel and the silt ranges in color from black to dark brown. Interbedded clays, silts, sands and silty sands underlie the fill. Consolidated bedrock is generally encountered at 6.5 to 8 ft below grade and is described as hard, fractured, and red in color. Several boring logs show 1 to 2 ft of weathered shale bedrock above consolidated bedrock.

A geologic cross-section through 160/174 Essex St. is found in Document # M-597, Figures 14 and 15, Diagrammatic cross-section Section F-F' of Lodi Study Area.

C. Site Specific Geophysical

No geophysical information was located.

D. Site-Specific Geotechnical

No Geotechnical information was located.

E. Site-Specific Hydrogeology

Depth to water table varies from 4.9 ft to 10.9 ft below grade (Document # M-075). The average is 8 ft below grade. No other hydrogeological information was located.

F. Civil/Survey Information

No surveys were located for this site.

G. Underground Utilities

Some utility information was located for this site. A 3,000-gallon UST, used to store gasoline, is located on-site. The tank was installed on 01/01/99 and is constructed of cathodically protected steel. There is no information on leak detection tests or test results.

H. Previous Investigations

Results of radiological surveys were reported by Oak Ridge National Laboratory (M-054 and M-058) in ORNL/RASA-88/49 (160 Essex Street) and ORNL/RASA-88/50 (174 Essex Street) and by Bechtel National, Inc. in DOE/OR/20722-251 (M-075). Characterization activities consisted of outdoor gamma scans, surface and subsurface soil sampling, and borehole installation/downhole gamma logging.

160 Essex Street

Surface exposure rates ranged from 3 - 11 μR/h over most of the property. Soil samples contained up to 3.0 pCi/g ^{226}Ra and 26 pCi/g ^{232} Th. The location of these samples, combined with the downhole gamma logging data, indicate moderate contamination to the south of the Lodi Brook culvert to depths of approximately 0.5 - 2.5 feet below the ground surface. The BNI report indicated that the depth of contamination had not yet been evaluated. Some borehole data in their report indicate that the depth might extend to as much as six feet below the ground surface.

174 Essex Street

Surface exposure rates ranged from 6 - 10 μR/h over most of the property. Exposure rates in the building ranged from 5 - 8 μR/h. The ORNL investigation found a small area in the southeast portion of the property which contained elevated concentrations of radionuclides of concern to depths of approximately 3 feet below the ground surface. Maximum ^{226}Ra and ^{232}Th concentrations were 5.1 and 49 pCi/g, respectively. BNI reported that this contamination may extend to depths of six feet.

The areas identified with subsurface contamination can be seen in the attached figure. In the scope of work prepared for the field demonstration project, the ACE estimated 1,140 cubic yards of contaminated material on the property.

I. Previous Investigations (Environmental)

No environmental investigation information was located for this site.

J. Summarize Data Gaps

Pilot Study:

Historical - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil to be acquired for the pilot study.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for the pilot study for this site include laboratory data needed for design of the soil washing system.

Hydrogeological Data - Some site-specific hydrogeological data is available; however, it does not constitute a site-wide hydrogeological characterization. It may be necessary to obtain additional hydrogeological data in order to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - Existing data are sufficient to identify the areas with the volume of soil containing radionuclides of concern which exceed the cleanup level. This property does not meet the monthly pilot study requirement of a minimum 1,800 yd^3 of contaminated material.

Environmental Data - Some chemical data exists for site soil and groundwater; however, this data is not sufficient to characterize site soils and groundwater for pilot study (including disposal) and health and safety purposes.

Design Data Gaps:

Historical Data - See Pilot Study Data Gaps.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Geophysical Data - See Pilot Study Data Gaps.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - See Pilot Study Data Gaps.

Civil/Survey Data - See Pilot Study Data Gaps.

Underground Utility Data - See Pilot Study Data Gaps.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - Some chemical data exists for site soil and groundwater; however, this data is not sufficient to characterize site soils and groundwater for remedial design (including disposal) and health and safety purposes.

Hydrogeologic Data - See Pilot Study.

Civil/Survey Data - See Pilot Study above.

Underground Utility Data - See Pilot Study above.

Radiological Survey - A surface walkover exposure rate scan will be conducted at the outset of the field investigation. Surface in situ gamma measurements and hollow measurement tube (push-pipes) placement/in situ gamma spectroscopy data collection are needed to establish the cut lines necessary to limit future excavation to soil containing radionuclides at concentrations which exceed the release criteria developed for the site. The number and locations will be determined following completion of the geostatistical analysis currently underway on the existing data base.

Environmental Data - If available data (including data obtained for pilot study) is insufficient for design, additional samples (soils or groundwater) will be collected for chemical analysis. Determination of location and number of sampling points will be coordinated with geotechnical, radiological, geological, and hydrogeological data needs.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Bank of New York

Property Address: 160/174 Essex St., Lodi

County/State: Lodi, New Jersey

Property Use:

Company Name: Bank of New York

Company Contact Name : Steve Brindisi, Property Management, Dean Steigauf

Company Contact Address/Phone No.:
(212) 437-2839, (201) 437-2853

Current Property Use: Commercial Bank

Hours of Operation: Nine to Five, Monday to Friday

Past Uses: National Community Bank

Property Description:

Lot Size: 100,000 ft^2

No. of Buildings : 1 main building and 1 storage building

Building(s) size (each): 19,000 ft^2.

Year built: Unknown

Zoning: Commercial

Uses of Adjacent Properties:

North:	Commercial - 113 Essex St. and Route 17S and Essex St.
East:	Military Reserve Facility
South:	I-80
West:	Commercial

Nearest structure on adjacent properties and each side of site boundary:
North – Essex St.
South – I-80
West – I-80 Westbound Right of Way

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ____________________
Equipment ID No.: ____________________
Installation Date: ____________________
Labels: ____________________
Fluid volume: ____________________

Is there any secondary containment?

____

Is any of the equipment leaking or damaged? If so, describe: ____________________

Is there any known history of leaks or discharges?

____

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Yes

	Tank 1	Tank 2	Tank 3
Tank capacity:	3,000 gallons		
Substance Stored:	Gasoline		
Installation Date:	01/01/1987		
Registration (Y/N)	Yes		
Corrosion protection	Cathodically protected steel		
Single or double-walled			
Leak detection tests (Y/N)	Unknown		
Results of testing:	Unknown		

Any known history of leaks ? Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:
NA

Were there past operations conducted on the property that required the use of USTs? If so, describe: NA

Are there any USTs removed from service, but left in the ground?

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).

Any history of leak or discharge from ASTs?

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: Unknown

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste

(Includes biological or medical)

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	PDI Investigation
USGS maps		x	PDI Investigation
State wetland maps		x	PDI Investigation
Federal wetland map		x	PDI Investigation
Sanborn historical maps		x	PDI Investigation
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Property owner
Foundation drawings		x	Property owner
Loading & Foundation Design Dwgs.		x	Property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides	x		
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification	x		PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

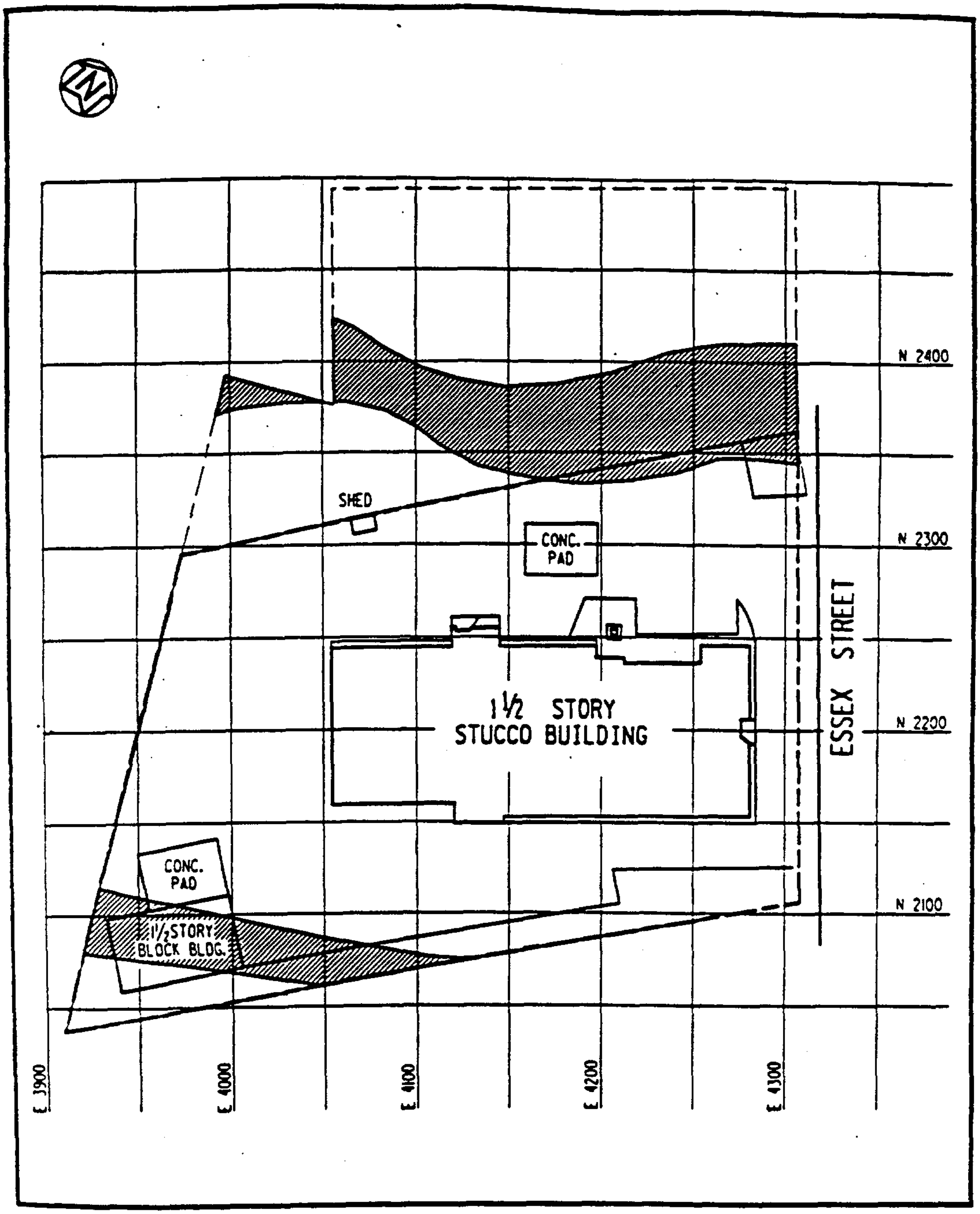


FIGURE 5-1 AREAS OF SUBSURFACE CONTAMINATION AT 160 AND 174 ESSEX STREET

N38V3855.DGN

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

I-80 WESTBOUND RIGHT-OF-WAY

A. Description of Property

The I-80 Westbound Right-of-Way is located on the north side of I-80 in Lodi, New Jersey. The site is partly paved. Several areas of concern lie to the east and north of the property. To the east lies the Bank of New York-owned 160/174 Essex St. property, and to the north lies the Bank of New York-owned 113 Essex St. property. I-80 continues to the west and there are residential properties to the west and south. Lodi Brook is open and above ground in a small area perpendicular to the right-of-way. This location is part of the original channel of Lodi Brook, although much of it has been filled in over the years. According to an employee at the bank located adjacent to this area (M-209), the original stream channel was approximately 8.0 to 10.0 ft deep and 15 to 18 ft wide. The present channel is neither as wide nor as deep. Locations where radioactive contamination was detected on this property lie along either side of the area where Lodi Brook is open and above ground. This area may at one time have been part of the original stream channel or its associated floodplain (M-209).

B. Site-Specific Geology

During November 1990, soil borings were installed on the property . According to resulting geologic logs, borings were drilled to a maximum depth of 15 ft, the average depth being 10 ft. Gravelly silty sand, dark reddish brown in color, fine to medium-grained, moderately sorted with subrounded to subangular fragments, is overlain by light brown sand, interlayered with some very fine sand, moderately well sorted, overlain by silty clay, greenish gray in color, moderately plastic with layers of fine sand, overlain by a silty sand fill, grayish black to brown in color, with brick fragments and debris. This fill material does not cover the entire site. Some areas of the site are paved.

C. Site Specific Geophysical

There is no site-specific geophysical information for this property.

D. Site-Specific Geotechnical

There is no site-specific geotechnical information for this property.

E. Site-Specific Hydrogeology

The depth of the water table ranges from 7 ft to 10 ft below grade. There is no other site-specific hydrogeologic information available for this property.

F. Civil/Survey Information

There is no site-specific civil/survey information for this property.

G. Underground Utilities

There is no site-specific underground utility information for this property.

H. Previous Investigations (Radiological)

The initial radiological characterization was performed in 1988 by Oak Ridge National Laboratory (ORNL). The data from that effort are provided in Results of the Radiological Survey at Interstate 80, North Right Of Way at Lodi Brook, Lodi, New Jersey (M-056, ORNL/RASA-88/66, June, 1989). A surface gamma scan identified slightly elevated exposure rates ranging from 13-26 μR/h in the eastern corner of the right of way, west of the exposed portion of the Lodi Brook. Boreholes were installed to depths of approximately 10 feet and surface and subsurface soil samples were collected for radionuclide analyses. Thorium-232 was identified as the primary contaminant of concern; maximum concentrations of 21 pCi/g and 7.3 pCi/g were found in biased surface and subsurface soil samples, respectively. Gamma logging count rate data collected within boreholes indicated that the depth of contamination extended to approximately 4-5 feet below the ground surface.

I. Previous Investigations (Environmental)

There is no previous environmental investigation information for this property.

J. Summarize Data Gaps

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geological Data – Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, or other structures to be protected will also be required.

Hydrogeological Data – Some site-specific hydrogeological data is available; however, it does not constitute a complete hydrogeological characterization. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data – Additional data are needed to define the extent of contamination. It is possible that the depths of contamination are such that hand-installed boreholes, surface in situ gamma spectroscopy data, and collection of subsurface soil samples for radionuclide analyses may be sufficient to complete the PDI.

If contaminated residues exist at depths greater than a few feet, then borehole installation/downhole gamma spectroscopy measurements will be needed to determine the vertical extent of contamination.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements will be outlined in the Groundwater Investigation Work Plan.

References

(M-056), Results of the Radiological Survey at Interstate 80, North Right of Way at Lodi Brook, Lodi, New Jersey (LJ077), Oak Ridge National Laboratory, June 1989.

(M-091), Radiological Characterization Report for the Property at Interstate 80 (Eastbound Right of Way), Bechtel National, Inc., September 1989.

Remedial Investigation Report for the Maywood Site, Volume 1, Maywood, New Jersey, Bechtel National, Inc. December 1992.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: I-80 Westbound Right-of-way

Property Address: I-80 Westbound Right-of-way

County/State: Lodi, New Jersey

Property Use:

Company Name: NJDOT

Company Contact Name : Scott Sheldon

Company Contact Address/Phone No.: (973) 770-5138

Current Property Use: None

Hours of Operation: NA

Past Uses: None

Property Description:

Lot Size: Unknown

No. of Buildings : None

Building(s) size (each): NA

Year built: NA

Zoning: Industrial

Uses of Adjacent Properties:

North: Essex Street and 113 Essex Street.

East: 160/174 Essex Streets
South: I-80
West: I-80 and Riverview Avenue

Nearest structure on adjacent properties and each side of site boundary:
North - Bank of New York Building located on 113 Essex St.
East - Bank of New York Building located on 160/174 Essex St.
South - I-80
West - Residential properties

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? No

Type of equipment: ________
Equipment ID No.: ________
Installation Date: ________
Labels: ________
Fluid volume: ________

Is there any secondary containment?
NA

Is any of the equipment leaking or damaged? If so, describe: NA

Is there any known history of leaks or discharges?
NA

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? No

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? NA

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? NA

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe: No

Were there past operations conducted on the property that required the use of USTs? If so, describe: Unknown

Are there any USTs removed from service, but left in the ground? Unknown

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). NA

Any history of leak or discharge from ASTs? NA

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: No

Describe condition of containers (is there any corrosion or leakage?)
NA

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Hazardous Waste Storage and Disposal

EPA Identification number for site: NA

Hazardous waste stored or generated on site *(Includes biological or medical)*	Quantities:	Disposition of Haz. Waste

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
NA

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		Addition sampling during PDI Investigation
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	Groundwater Investigation
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	Groundwater Investigation
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing			Not Applicable
Exposure Rate or Surface Scan	x		Additional to be collected during PDI as needed.
Downhole Gamma Logging	x		Additional to be collected during PDI as needed.

ORNL-DWG 89-10628

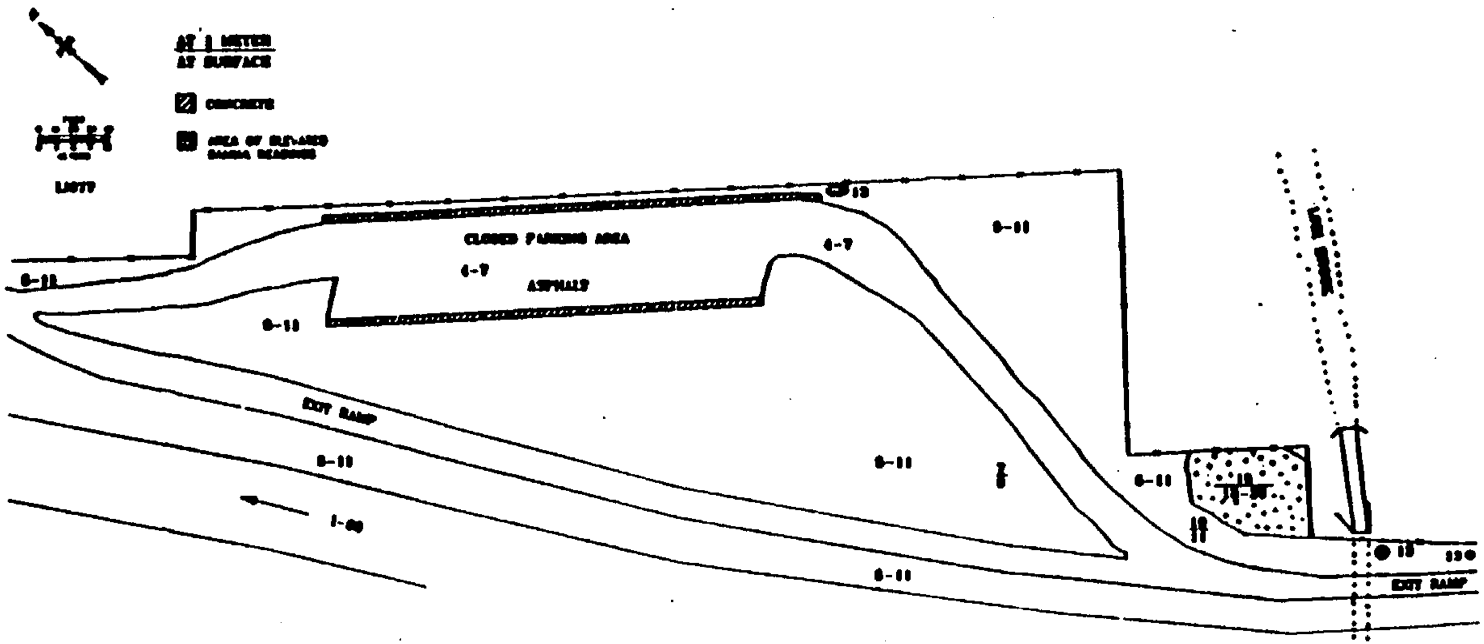


Fig. 1. Gamma radiation levels (μR/h) measured on the surface at Interstate 80, North Right of Way at Lodi Brook, Lodi, New Jersey (LJ077), with corresponding measurements one meter above the surface where indicated.

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ORNL-DWG 89-10629

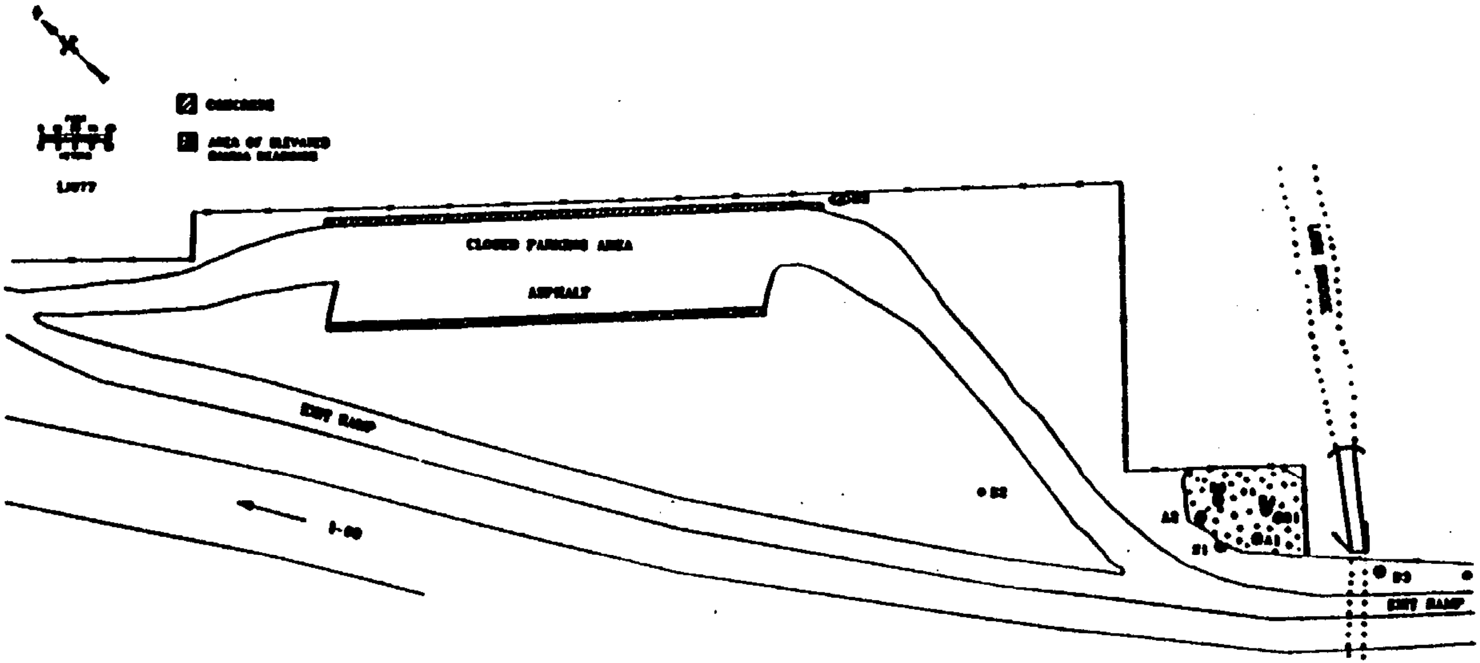

Fig. 2. Diagram showing locations of soil samples taken at Interstate 80, North Right of Way at Lodi Brook, Lodi, New Jersey (LJ077).

Property Cluster No. 5

- Route 17 South and Essex Street (Muscarelle)
- 113 Essex Street (Bank of New York)
- 200 Route 17 South (Sears Small Truck Repair)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

RT. 17 SOUTH AND ESSEX STREET (Joseph Muscarelle Associates)

A. Description of Property

The Joseph Muscarelle Associates property is located at the corner of Essex Street and Route 17 South (adjacent to the Route 17 South exit ramp for Essex Street). The site contains one muti-storied building and is surrounded by asphalt pavement with small landscaped areas adjacent to the building on three sides. The building contains offices, open clerical areas, conference rooms used for engineering design services. A basement area contains offices, storage areas, and a boiler room. There are both front and rear entrances to the building. Employees are present 5 days per week for 8 hours per day (M-698).

The north side of the property is bordered by 113 Essex Street (former National Community Bank and current Bank of New York) which is also a property covered under this PDI Investigation. The Route 17 exit ramp lies to the east of the property and Essex Street borders the property to the south. One (1) 5,000 gallon UST containing gasoline has been identified on the property (M-698). A former 2,000 gallon gasoline UST located near Essex Street was removed from service in 1993. Soil samples were collected and no contamination was detected above the NJDEP cleanup criteria. The property has two NJDEP enforcement cases (#92-03-12-1004, #93-03-0900) both related to the 2,000 gallon UST. A letter of No Further Action was issued by the NJDEP on October 14, 1993 (Environmental Resolutions, Remedial Investigation Proposed Sampling Plan, February, 1999).

B. Site-Specific Geology

The property at Rt 17 and Essex Street is located in northeastern New Jersey within the glaciated section of the Piedmont Plateau. The topography is primarily flat with minor relief. Site-specific geologic information is not available for this site, however the stratigraphy of adjacent sites consists of unconsolidated sands, silts, and gravel underlain by bedrock (M-698).

C. Site Specific Geophysical

A GPR survey was conducted at the Muscarel Site by Bechtel National, Inc. in 1990. The purpose of the GPR investigation was to identify and delineate the extent of a suspect buried stream channel (Lodi Brook) and determine any other geophysical anomalies. Based on the results of the GPR survey, a potential stream channel and culvert were detected on the north end of the site. In addition a few discrete reflectors indicative of buried objects or utilities were observed, particularly in the southwestern portion of the survey area. GPR reflectors indicated that backfill materials were also evident throughout most of the site (M-727).

The results of the GPR survey indicated that Bedrock depths vary across the site, particularly in the northern section of the site. Bedrock depths were observed to gradually increase towards the west ends of survey lines 14, 16, 17, and 18. Shallow bedrock was observed on the east ends of survey lines 1, 2, and 3 (M-727).

The eastern boundary of the stream channel was inferred along the traverse lines. The western boundary of the stream channel was not easily identified and there may be trenches containing utilities in the area of the western boundary. Backfill material may be present in the southern portion of the survey area, which appears to be different from backfill materials observed in the northern survey area (M-727).

D. Site-Specific Geotechnical

No geotechnical laboratory information was found.

E. Site-Specific Hydrogeology

Site-specific hydrogeologic information was not found.

F. Civil/Survey Information

No civil/survey information was found.

G. Underground Utilities

Based on GPR information, potential utility trenches exist in the survey area. In addition, 1-5,000 gallon UST containing gasoline has been identified on the property. As mentioned, 1-2,000 gallon gasoline UST was removed from service. No other information regarding underground utilities was found.

H. Previous Investigations (Radiological)

Radiological data are provided in Results Of The Radiological Survey At Essex Street And State Route 17 (MJ036), Maywood, New Jersey (M-727, ORNL/RA-SA-88/24). The investigation consisted of a gamma scan and collection of surface and subsurface soil samples for radionuclide analyses.

Exposure rates ranged from 7-11 μR/h over the major portion of the property. As can be seen on the attached figure, several areas with elevated exposure rates were identified. They included an area near the northwest corner of the building (15-54 μR/h), a portion of the area south of the building (15-49 and 15-30 μR/h), and several small spots located on the front lawn between the building and the parking lot.

Thirteen soil samples were collected from five biased locations. Radium-226 concentrations ranged from 1.1-6.0 pCi/g. Thorium-232 concentrations ranged from 2.3-61 pCi/g.

In the Remedial Investigation Report For The Maywood Site (M-209, DOE/OR/21949-337), additional exposure rate and soil concentration data were provided. Gamma radiation measurements ranged from background to approximately six times background (equivalent to approximately 50 μR/h). Thorium-232 maximum concentrations of 22 pCi/g and 6.1 pCi/g were found in surface and subsurface soil samples, respectively.

Interior and exterior exposure rate data are provided in M-698. They ranged from 8.9-10.6 μR/h (interior) and 8.9-16.5 μR/h (exterior). Radon samples collected in the building ranged from less than 0.3-0.4 pCi/L; the thoron concentration was less than 1.0 pCi/L.

I. Previous Investigations (Environmental)

Environmental samples were collected during removal of the 2,000 gallon UST. Results of samples indicated that no contamination was detected above the NJDEP cleanup criteria (Remedial Investigation Proposed Sampling Plan, Environmental Resolutions, February, 1999). No other environmental investigations were found.

J. Summarize Data Gaps

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geological Data - No site-specific geological data is available. Geologic data is required to quantify volumes of fill/soil to be acquired for the design study.

Geophysical Data - Geophysical data for the site is available for location of the stream channel, potential buried objects, and/or utilities. Additional data may be needed to be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Workplan.

Radiological – Additional data are needed to define the extent of contamination. It is possible that the depths of contamination are such that hand-installed boreholes, in situ gamma spectroscopy data, and collection of subsurface soil samples for radionuclide analyses may be sufficient to complete the PDI. If contaminated residues exist at depths greater than a few feet, then borehole installation/downhole gamma spectroscopy measurements will be needed to determine the vertical extent of contamination.

References

M-698, Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site, Bechtel National, Inc., August, 1994.

M-727, Results from Ground Penetrating Radar Survey at the Stepan Chemical and Muscarelle Sites, Bechtel National, Inc., November, 1990.

Remedial Investigation Proposed Sampling Plan for the New Jersey State Highway Route 17 at Essex Street in Maywood, New Jersey, Environmental Resolutions, Inc., February, 1999.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Joseph Muscarelle Association

Property Address: Rt. 17 South and Essex Street

County/State: Borough of Maywood, County of Bergen, New Jersey

Property Use:

Company Name: Joseph Muscarelle Association

Company Contact Name :Joseph Muscarelle

Company Contact Address/Phone No.: (201) 845-8100

Current Property Use: Engineering design firm

Hours of Operation: 5 days/week, 8 hours per day

Past Uses: Unknown

Property Description:

Lot Size: 70,000 square feet

No. of Buildings :1

Building(s) size (each):8,300 square feet

Year built: Unknown

Zoning: Commercial

Uses of Adjacent Properties:

North: 113 Essex Street
East: Route 17 Exit Ramp

South: Route 17 Exit Ramp
West: Essex Street

Nearest structure on adjacent properties and each side of site boundary:
North (Bank of New York);
South and East (Route 17 Exit Ramp);
West (Essex Street)

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property?Unknown

Type of equipment:
Equipment ID No.:
Installation Date:
Labels:
Fluid volume:

Is there any secondary containment?
Unknown

Is any of the equipment leaking or damaged? If so, describe:
Unknown

Is there any known history of leaks or discharges?
Unknown

Underground Storage Tanks (USTs)

Are there any known USTs located on the property?Yes

	Tank 1	Tank 2	Tank 3
Tank capacity:	5,000 gallons	2,000 gallon (removed)	
Substance Stored:	Heating Oil No. 2	Gasoline	
Installation Date:	1/1/57		
Registration (Y/N)	Yes		
Corrosion protection	Cathodic		
Single or double-walled	Unknown		
Leak detection tests (Y/N)	Unknown		
Results of testing:	Unknown		

Any known history of leaks ? The 2,000 gallon gasoline UST located near Essex Street was removed in 1991 (NJ State Highway Route 17, Remedial Investigation Proposed Sampling Plan, 2/99)

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:
Unknown

Were there past operations conducted on the property that required the use of USTs? If so, describe:
Unknown

Are there any USTs removed from service, but left in the ground?
Unknown

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).Unknown

Any history of leak or discharge from ASTs? Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: NA

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
NA

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		1989
Organic Compounds		x	PDI Investigation (Limited for 2,000 gallon gasoline UST removal only)
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	PDI Investigation
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Geophysical Investigations			
GPR Surveys	x		1989

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Magnetometer Surveys		x	PDI Investigation
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	PDI Investigation
Water table fluctuations		x	PDI Investigation
Direction of groundwater flow		x	PDI Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

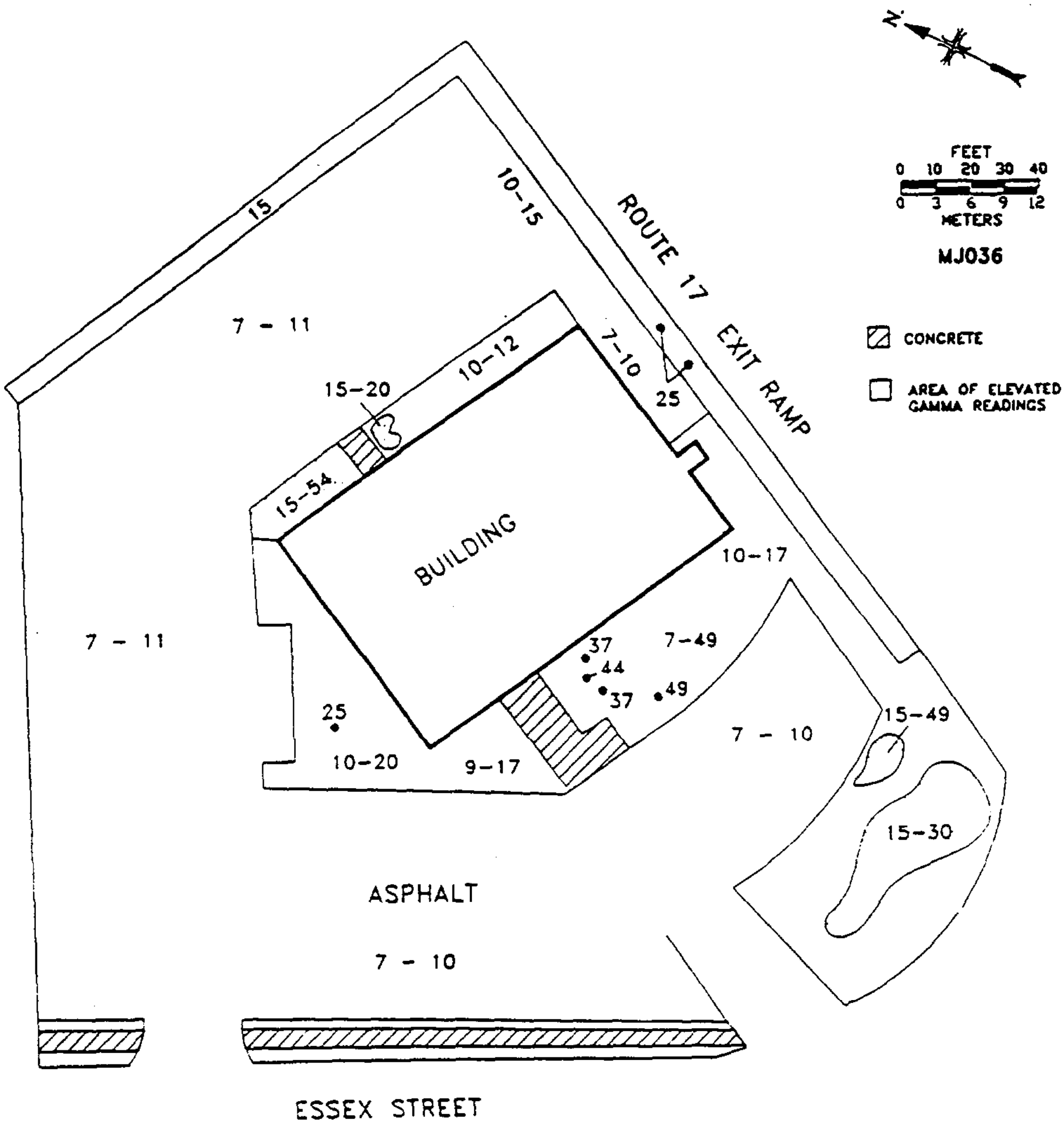

Fig. 1. Gamma radiation levels (μR/h) measured on the surface at Essex Street and State Route 17, Maywood, New Jersey (MJ036).

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

113 ESSEX STREET (Bank of New York)

A. Description of Property

The Bank of New York (former National Community Bank) property is located at 113 Essex Street, Maywood, New Jersey. It was built in the mid-1960's. Before the bank was constructed, the contaminated Lodi Brook crossed the property in four underground 24-inch concrete pipes. At present, it crosses the bank property in a new concrete box culvert a few feet south of the original easement at the rear of the building. From the original point of entry to the property at State Route 17, the new easement parallels the southeast wall of the building until it reaches the front lawn, where it angles back to the original easement and goes under Essex Street. Movement of soil during installation of the original four pipes, and again during relocation of the stream to the new culvert, could have spread contamination over a large portion of the property.

This property was purchased by the Bank of New York in 1994. Currently, there are no full-time employees except for a security guard. Most of the property is covered in asphalt pavement and there is a small landscaped lawn area in front of the building. The brick veneer building is two stories tall with a full basement, which contains a cafeteria, several large work areas, and a boiler room.

Adjacent areas of concern include the 200 Route 17 S property (Sears Truck Repair) to the north and the Route 17 S and Essex Street property (Joseph Muscarelle Associates) to the south. Residential properties lie to the west and State Route 17 lies to the east.

B. Site-Specific Geology

No geological information was located.

C. Site Specific Geophysical

No geophysical information was located.

D. Site-Specific Geotechnical

No geotechnical laboratory data was located.

E. Site-Specific Hydrogeology

No hydrogeological information was located.

F. Civil/Survey Information
No surveys were located for 113 Essex St.

G. Underground Utilities

A map showing the S. Sewer Easement and a drainage easement was located in the 1994 FUSRAP Administrative Record for Maywood, NJ, # M-698. No utility information was found.

H. Previous Investigations (Radiological)

The 1992 Remedial Investigation Report for the Maywood Site (Bechtel National, Inc., DOE Contract No. DE-AC05-91OR21949) consisted of outdoor exposure rate measurements with a 2" x 2" sodium iodide coneshielded gamma detector and collection of surface and subsurface soil for thorium, radium and uranium analysis. Boreholes were installed and downhole gamma count rate data were collected.

The surface gamma radiation and exposure rate measurements were slightly elevated. Downhole gamma logging was performed in 37 boreholes. Nine of these boreholes contained contamination. The location of surface and subsurface contamination can be seen on the attached figure.

A total of 9 surface soil samples were collected; one of these samples had elevated radionuclide concentrations (greater than 5 pCi/g ^{232}Th. Subsurface soil samples were collected from 34 boreholes, nine of which contained elevated radionuclide concentrations. Maximum ^{232}Th, ^{226}Ra, and ^{238}U concentrations of 18 pCi/g, 10 pCi/g, and 8 pCi/g , respectively, were detected. Subsurface contamination was measured at three different locations. The depth of contamination at the first location ranges from 3.5 to 4.5 feet, at the second location from 7 to 9 feet, and the third location from 0.5 to 7.5 feet, as noted on the figures.

The RI identified that the surface and subsurface radioactive contamination cover approximately 5% of the areal extent of the property. The contamination is primary located near the southeastern corner of the property. In the scope of work prepared for the field demonstration project, the ACE estimated 1,350 cubic yards of contaminated material on the property.

I. Previous Investigations (Environmental)

No environmental investigation information was located.

J. Summarize Data Gaps

Pilot Study Data Gaps:

Radiological - Existing data are sufficient to identify the areas with the volume of soil containing radionuclides of concern which exceed the cleanup level. This property does not meet the monthly pilot study requirement of a minimum 1,800 yd^3 of contaminated material.

Design Data Gaps:

Historical Data - Historical - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Work Plan.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Bank of New York

Property Address: 113 Essex Street

County/State: Maywood, New Jersey

Property Use:

Company Name: Bank of New York

Company Contact Name : Dean Steigauf

Company Contact Address/Phone No.: (201) 437-2853

Current Property Use: Not in use

Hours of Operation: None, Security Guard present

Past Uses: Since the Mid-1960's, the property was owned by the National Community Bank. In 1994, the Bank of New York purchased the property.

Property Description:

Lot Size: 75,000 ft^2

No. of Buildings : One

Building(s) size (each): Two-story Masonry Building, 22,000 ft^2.

Year built: Mid-1960's

Zoning: Commercial

Uses of Adjacent Properties:

North:	200 State Route 17 S. Property (Sears Truck Repair)
East:	State Route 17 S. and Essex Street Property (J. Muscarelle)
South:	Essex Street and Borough of Lodi, Residential
West:	Township of New Rochelle Park, Residential

Nearest structure on adjacent properties and each side of site boundary:
Commercial and residential buildings

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment:
Equipment ID No.:
Installation Date:
Labels:
Fluid volume:

Is there any secondary containment?

Is any of the equipment leaking or damaged? If so, describe:

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? ______________________________

____

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? ______________________________

____

____

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:
Unknown

____

____

Were there past operations conducted on the property that required the use of USTs? If so, describe: Unknown

____

____

Are there any USTs removed from service, but left in the ground?

____

____

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). NA

Any history of leak or discharge from ASTs? NA

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: No

Describe condition of containers (is there any corrosion or leakage?)
NA

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Hazardous Waste Storage and Disposal

EPA Identification number for site: NA

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Water and Wastewater

Are there any sanitary or septic system on the site?
The S. Sewer Easement runs from north to south along the western end of the property.

Note source of water for the site, and identify on-site wells
Municipal water supply

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines	x		Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Potentially from property owner
Foundation drawings			Potentially from property owner
Loading & Foundation Design Dwgs.			Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides	x		
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Organic content			PDI Investigation
Moisture content			PDI Investigation
Soil classification			PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	PDI Investigation
Water table fluctuations		x	PDI Investigation
Direction of groundwater flow		x	PDI Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

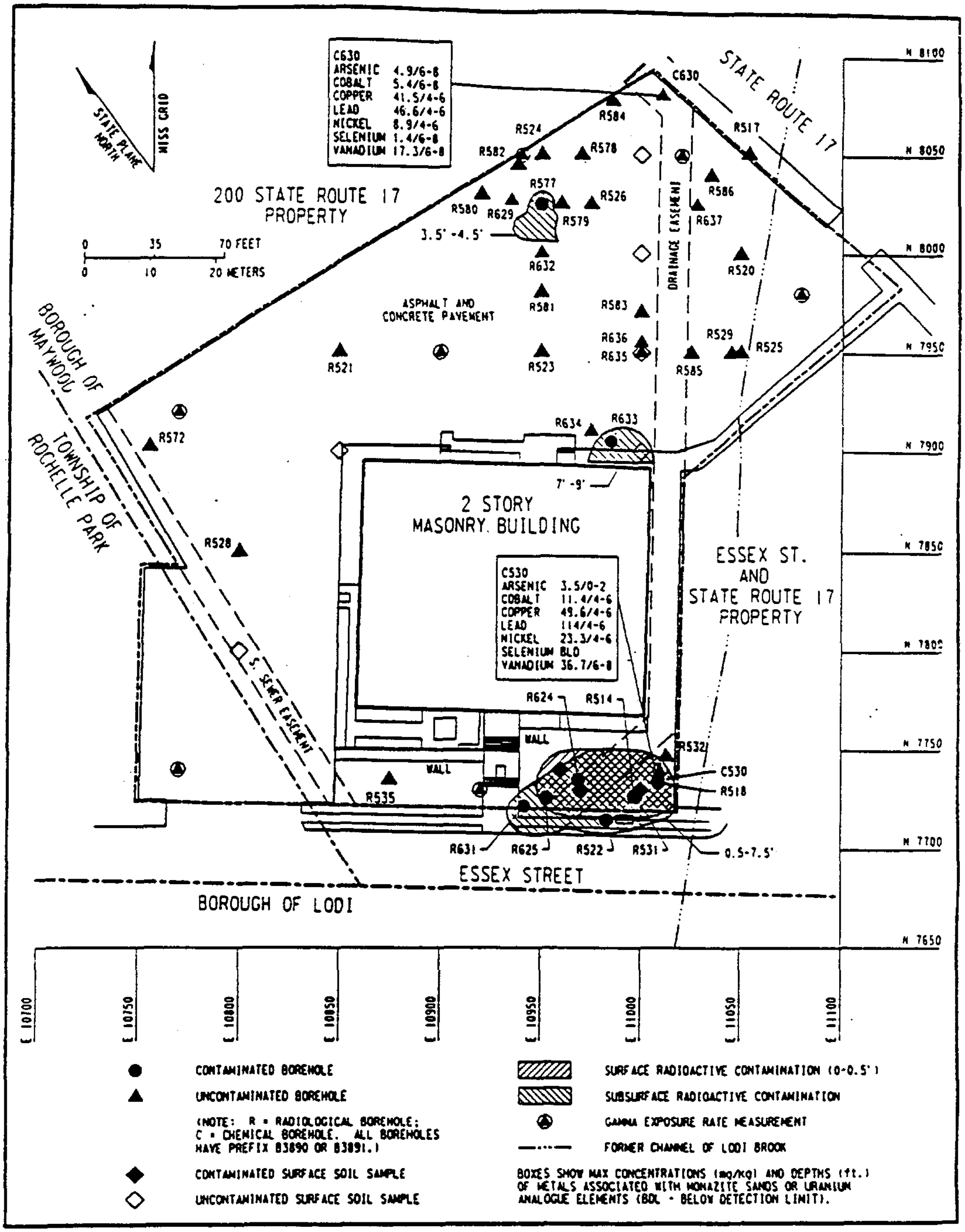

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Figure 4-61
113 Essex Street Sampling Locations and Areas of Radioactive Contamination

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

200 ROUTE 17S (Sears Repair Center)

A. Description of Property

The 200 Route 17 South Property, also known as the Sears Repair Center, is a leased facility that includes a retail sales area, telemarketing area, television repair, small engine repair, offices for clerical personnel, parts warehouse, employee lunchroom, loading dock, and an unoccupied area that has been used for offices. The facility is operated 6 days per week (number of hours unknown) and there are approximately 30 to 35 employees. Most of the property's exterior is covered by asphalt pavement. The property is accessed from Route 17 South, which lies just east of the property. An aboveground, unconfined portion of Lodi Brook flows parallel with Route 17 South along the southeastern property boundary. At the point where the brook exits the property, it enters a concrete conduit and subsequent box culvert on the adjacent property to the south, 113 Essex St., another property of concern. Radioactive contamination has been found in the area where the brook is aboveground. At the southern end of the building, in the parking area, there is a buried petroleum tank and an aboveground gasoline pump used to fuel delivery/service vehicles operated by the Sears facility. Residential properties lie to the west and there is another Sears property, 149-151 Maywood Avenue, located to the north.

B. Site-Specific Geology

There is no site-specific geological information available for this property.

C. Site Specific Geophysical

There is no site-specific geophysical information available for this property.

D. Site-Specific Geotechnical

There is no site-specific geotechnical information available for this property.

E. Site-Specific Hydrogeology

There is no site-specific hydrogeological information available for this property.

F. Civil/Survey Information

No surveys were located.

G. Underground Utilities

At the southern end of the building, in the parking area, there is a buried petroleum tank and an above-ground gasoline pump used to fuel delivery/service vehicles operated by the Sears facility.

H. Previous Investigations (Radiological)

The 1992 Remedial Investigation Report for the Maywood Site (Bechtel National, Inc., DOE Contract No. DE-AC05-91OR21949) consisted of outdoor exposure rate measurements with a 2" x 2" sodium iodide coneshielded gamma detector and collection of surface and subsurface soil for thorium, radium and uranium analysis. Boreholes were installed and downhole gamma count rate data were collected. Refer to attached figure for the location surface and subsurface contamination.

A total of 36 surface soil samples were collected; eight of these samples had elevated concentrations; with maximum ^{232}Th and ^{226}Ra concentrations of 59 pCi/g and 6 pCi/g, respectively. Subsurface soil samples were collected from 36 boreholes; 11 of these boreholes contained elevated radionuclide concentrations, with maximum ^{232}Th, ^{226}Ra, and ^{238}U concentrations of 48 pCi/g, 4 pCi/g, and 9 pCi/g, respectively. Subsurface contamination ranged from 0.5 to 3.5 feet, but elevated radionuclide concentrations in a soil sample was detected at a maximum depth of 7 feet.

The RI identified surface and subsurface radioactive contamination covering less than 10 % of the areal extent of the property (approximately 160 x 40 feet). The contamination is localized and present in the southeastern portion of the property and slightly extends outside the fence line. The RI Report did not specifically address the estimated volume of contaminated material; however, in the scope of work prepared for the field demonstration project, the ACE estimated 242 cubic yards of contaminated material on the property.

I. Previous Investigations (Environmental)

At 200 Route 17 S, two boreholes (C570 and C628) were sampled for chemical characterization. Soil samples were analyzed for VOCs, BNAEs, metals, rare earths, reactivity, corrosivity, and TPH. Borehole C570 was identified as radioactively contaminated (RI Report, 1992).

J. Summarize Data Gaps

Pilot Study Data Gaps:

Radiological - Pilot Study: Contiguous subsurface contamination covers a relatively small portion of the property and is located on the southeastern portion of the property. Surface contamination was also found in two small areas located in the northeastern side of the property. Inaccessible contamination is believed to be present beneath the building and paved areas, in the location of the former Lodi Brook. Based on the existing data, it is probable that sufficient volumes of contaminated soil in outdoor areas are not easily accessible. Therefore, this property is not a viable candidate for use in the pilot study.

Design Data Gaps:

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geological Data - No site-specific geological data is available. Geologic data is required to quantify volumes of fill/soil for site remediation design.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement. Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Work Plan.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Sears Repair Center

Property Address: 200 Route 17 S

County/State: Maywood, New Jersey

Property Use:

Company Name: Sears Repair Center, 200 Rt 17 Associates Limited Liability Co.

Company Contact Name : David Schlussel

Company Contact Address/Phone No.:(201) 836-6100

Current Property Use: Retail sales, telemarketing, television repair, small engine repair, parts warehouse, and offices

Hours of Operation: 6 days per week, number of hours unknown

Past Uses: Unknown

Property Description:

Lot Size: 95,000 ft^2

No. of Buildings :One Building

Building(s) size (each): 32,000 ft^2

Year built: Unknown

Zoning: Commercial

Uses of Adjacent Properties:

North: Sears - 149-151 Maywood Ave
East: State Route 17
South: 113 Essex Street
West: Residential - Township of Rochelle Park

Nearest structure on adjacent properties and each side of site boundary:
Commercial and residential buildings and a NJ State highway

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ______
Equipment ID No.: ______
Installation Date: ______
Labels: ______
Fluid volume: ______

Is there any secondary containment?
Unknown

Is any of the equipment leaking or damaged? If so, describe: ______

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Yes, 1 tank known

	Tank 1	Tank 2	Tank 3
Tank capacity:	Unknown		
Substance Stored:	Unknown		
Installation Date:	Unknown		
Registration (Y/N)	Unknown		
Corrosion protection	Unknown		
Single or double-walled	Unknown		
Leak detection tests (Y/N)	Unknown		
Results of testing:	Unknown		

Any known history of leaks ? Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe: Yes, Sears facility vehicles use the aboveground gasoline pump,located at the south end of the building.

Were there past operations conducted on the property that required the use of USTs? If so, describe: Unknown

Are there any USTs removed from service, but left in the ground?
Unknown

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).Unknown

Any history of leak or discharge from ASTs? Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: ______________________________

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
Unknown

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Local Utility Company
Foundation drawings		x	Property owner
Loading & Foundation Design Dwgs.		X	Property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds	x		
Metals	x		
PCBs	x		
Pesticides	x		
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Hydrometer Analysis		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	Groundwater Investigation
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing		x	
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

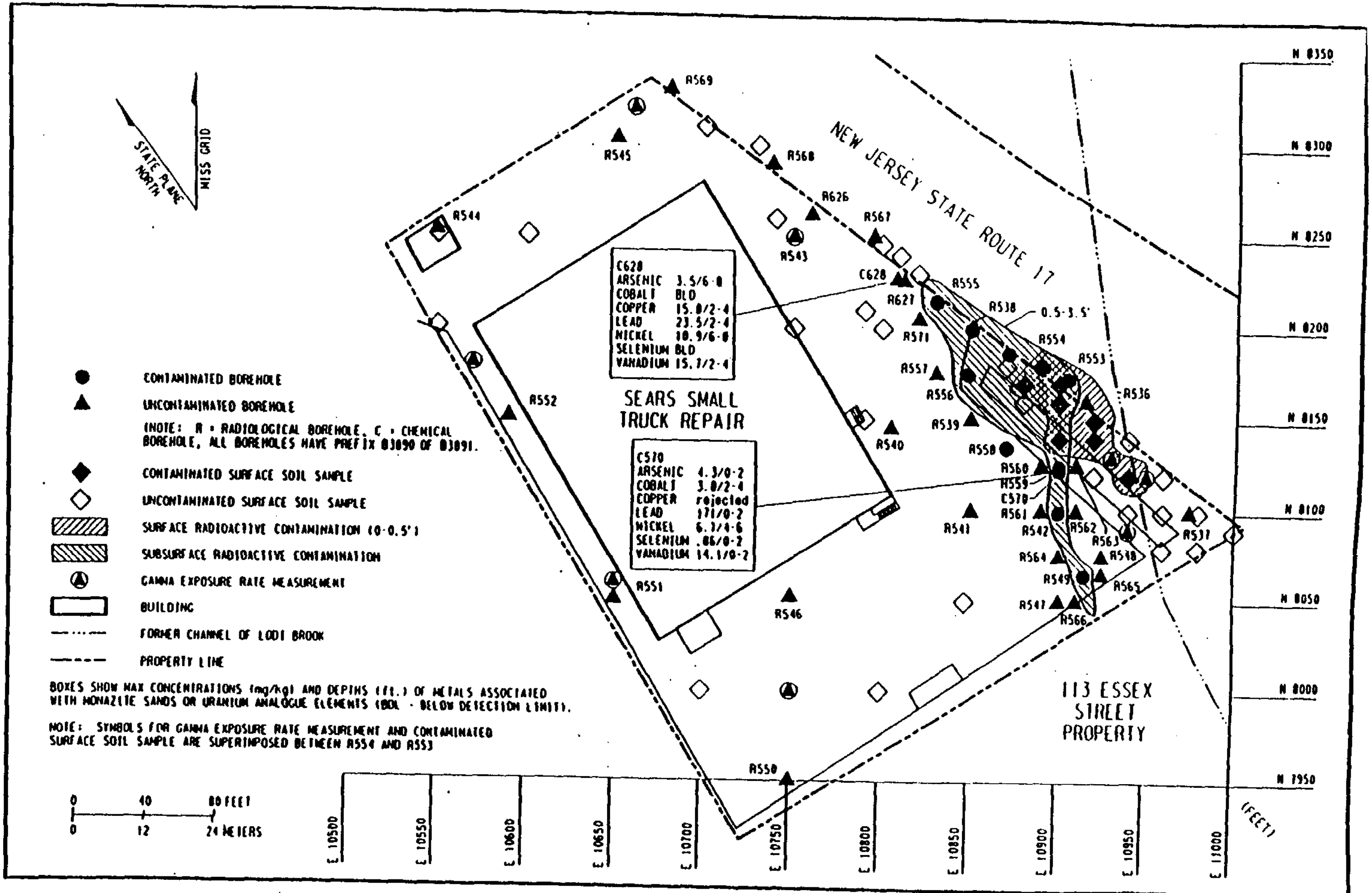

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Figure 4-57
200 State Route 17 Sampling Locations and Areas of Radioactive Contamination

Property Cluster No. 6

- 29 Essex Street (FedEx)
- 85-101 Route 17 North (Hunter Douglas, SWS Realty)
- 137 Route 17 North (AMP Realty)
- 167 Route 17 North (Sunoco Station)
- 239 Route 17 North (Gulf Station)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

29 ESSEX ST. (Federal Express)

A. Description of Property

The 29 Essex St. property, currently owned by Federal Express, comprises approximately 4.7 acres, and is located in a commercial/business area in Maywood, County of Bergen, New Jersey. The majority of the Federal Express property is paved, with the exception of the front lawn, which is located along Route 17. A 50,000-square-foot combination office-warehouse is located on the property. A small retention pond and unpaved area are located on the northeast part of the property. Prior to being owned by Federal Express, the property was owned by AMF Whitely, a sporting and athletic goods store. AMF Whitely was a large quantity generator.

The property at 29 Essex St. is bounded to the north by DeSaussure furniture company (one of the FUSRAP Maywood Superfund Sites), to the east by residential properties, to the south by NJ State Route 17 commercial properties, and to the west by 85-99 Route 17N, Architectural Window Manufacturing Corp. (another of the FUSRAP Maywood Superfund Sites). This Federal Express property is classified as a small quantity generator.

B. Site-Specific Geology

Five borings were conducted on the 29 Essex St. property during field investigations for the Stepan Property RI in February 1992 (document M-575, CH2M Hill, 1994). These soil borings were labeled as follows: C-26, C-28, C-30, C-32, and C-35. Fill materials were encountered in nearly every boring on the Federal Express property, from the surface to depths of approximately 2 feet. The soils at the 29 Essex St. property generally consist of silty sands and clayey sands. Bedrock depth varies across the site, ranging from within about 2 feet of the ground surface at boring C-30, to about 9 feet at boring C-35. Soil boring logs are included in Appendix D to document M-575.

C. Site Specific Geophysical

A surface geophysical investigation was conducted at the Federal Express property by CH2M Hill from September 18 to 20, 1991. The survey was conducted over approximately 2.6 acres of open area (paved and unpaved) around the facility. The remaining site was not investigated because it is occupied by a warehouse building and a pond in the northern part of the site. Magnetometer data were collected at 10-foot intervals along north-south grid lines. Nine areas of buried metal were identified at the Federal Express property. A test pit program was instituted to physically investigate anomalous areas of potential buried metal identified during the surface geophysics survey; seven test pits were excavated. Scrap metal was found in two of the test pits, and no metal was found in the remaining five test pits. Test pit logs are included in Appendix E to document M-575.

D. Site-Specific Geotechnical

Laboratory testing was conducted on a soil sample from boring C26. Soil from the 0-6 foot depth interval, composed of recent and stratified glacial deposits, was analyzed for grain size distribution, Atterberg limits, and moisture content. The results of the grain size distribution indicated that the sample contained 6.7% gravel, 64.4% sand, 21.1% silt, and 7.8% clay. The sample's liquid limit was 17, the plasticity index was 2, and the moisture content was 13.7%.

E. Site-Specific Hydrogeology

There are three monitoring wells on the Federal Express property: OBMW12, BRMW12, and BRMW9. Depth to water at well OBMW12 ranged from 6.05 feet (6/1/92) to 8.08 feet (10/2/92). Depth to water at well BRMW12 ranged from 4.44 feet (6/1/92) to 7.38 feet (10/2/92). Depth to water at well BRMW9 ranged from 15.75 feet (6/1/92) to 16.78 feet (11/5/92).

F. Civil/Survey Information

No civil/survey information is currently available.

G. Underground Utilities

No map showing underground utilities is currently available.

H. Previous Investigations (Radiological)

Documents M-112 and M-117 are correspondence dating from 1986 that indicate that no radiological contamination was found on the property. The letter from the USDOE to Mr. Frank Sisto of Voit Sports, Inc. mentions the results of a radiation scan of the ground surface as the basis for that conclusion. The letter also states that the property will be removed from the DOE remedial action program and that no radiological cleanup is required.

I. Previous Investigations (Environmental)

Five soil borings were advanced during Stepan RI activities (document M-575, CH2M Hill, 1994) to collect samples for chemical analysis. These soil borings were labeled as follows: C-26, C-28, C-30, C-32, and C-35. In addition, three monitoring wells were installed on the FedEx property during Stepan RI activities. Boring C-30 corresponds to monitoring well BRMW9 and boring C-35 corresponds to monitoring wells OBMS12/BRMW12. Twelve soil samples were collected from the five borings and analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. In addition, a sample collected from C-26 (depth 0-6 feet) was analyzed for TOC and found to contain 12,440 mg/kg TOC.

A surface water sample (SW-5) was collected from the pond in the northern portion of the Federal Express property in July 1992. Chemical analyses consisted of TCL organics (VOCs, semivolatiles, pesticides, and PCBs), TAL inorganics (metals and cyanide), caffeine, d-limonene, a-pinene, and lithium. The radiological analyses consisted of gross alpha and gross beta radiation, Ra-226, Ra-228, U-234, U-235, U-238, Th-230, and Th-232. Butyl benzyl phthalate and bis(2-ethylhexyl) phthalate were detected in sample SW-5 at concentrations of 120 ppb and 2ppb (estimated), respectively. Lead was detected above the NJDEP groundwater quality criterion of 5 ppb in sample SW-5 (11.9 ppb). U-235 was detected at an estimated concentration of 1.8± 1.3 pCi/L.

Two rounds of groundwater sampling were performed for the three monitoring wells at 29 Essex Street. Groundwater samples were analyzed for the same parameters listed above for the surface water sample. Low concentrations of cis-1,2-DCE, TCE, and chloroform were detected at the bedrock monitoring wells. Toluene was detected at 0.2 ppb at OBMW12. Bis(2-ethylhexyl) phthalate and di-n-butylphthalate were detected at 940 ppb and 3 ppb, respectively, at OBMW12. Bis(2-ethylhexyl) phthalate was detected at concentrations of 21 and 3 ppb at wells BRMW12 and BRMW, respectively. Lead was detected at 12.2 ppb and 32.6 ppb at wells OBMW12 and BRMW12, respectively. In addition, barium, chromium, nickel, manganese, and lithium were detected in the wells at 29 Essex St.

J. Summarize Data Gaps

Historical Data - Information is lacking or uncertain for previous property uses.

Geologic Data – Geologic data is sufficient.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, or other structures to be protected will also be required.

Geophysical Data – A magnetometer survey was conducted with the purpose of locating buried metallic objects. However, it may be necessary to collect additional data in order to fully characterize underground utilities/structures that may impact intrusive activities.

Hydrogeological Data - Some site-specific hydrogeological data is available; however, it does not constitute a site-wide hydrogeological characterization. It may be necessary to obtain additional hydrogeological data in order to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological - No data have been obtained for review.

Environmental Data - Some chemical data exists for site soil and groundwater; however, these data are not sufficient to characterize site soils and groundwater for remedial design (including disposal) and health and safety purposes.

References

(M-112) Letter to Whitely Division-Voit Sports with Characterization Results

(M-117) Letter regarding radiological status of AMF/Voit Property

(M-575) Maywood Chemical Company Site, Final Remediation Investigation Report, CH2M Hill, November, 1994

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Federal Express

Property Address: 29 Essex St.

County/State: Bergen County, New Jersey

Property Use:

Company Name: Federal Express

Company Contact Name : Aaron Werbin

Company Contact Address/Phone No.: (800) 475-1875

Current Property Use: Processing of Federal Express packages

Hours of Operation: Unknown

Past Uses: Previously owned by AMF Whitely, a sporting and athletic goods store. AMF Whitely was classified as a large quantity generator.

Property Description:

Lot Size: 4.7 acres

No. of Buildings : One

Building(s) size (each): Approx. 50,000 square feet

Year built: Unknown

Zoning: Commercial/Business

Uses of Adjacent Properties:

North: 23 W. Howcroft, DeSaussure furniture company

East: Residential properties
South: NJ State Route 17 commercial properties
West: 85-99 Route 17N, Architectural Window Manufacturing Corp.

Nearest structure on adjacent properties and each side of site boundary:
Nearest structure is to the west at 85-99 Route 17N. There is a building to the north at 23 W. Howcroft (DeSaussure furniture company).

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ______
Equipment ID No.: ______
Installation Date: ______
Labels: ______
Fluid volume: ______

Is there any secondary containment?

Is any of the equipment leaking or damaged? If so, describe: ______

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? ______________________________

____

____

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? ______________________________

____

____

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:

____

____

____

Were there past operations conducted on the property that required the use of USTs? If so, describe: ______________________________

____

____

Are there any USTs removed from service, but left in the ground?

____

____

____

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).

Any history of leak or discharge from ASTs?

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Hazardous Waste Storage and Disposal

EPA Identification number for site: NJD986585115 - Facility is a small quantity generator.

Hazardous waste stored or generated on site | Quantities: | Disposition of Haz. Waste

(Includes biological or medical)
Unknown

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal drinking water. There is a small retention pond in the northeast part of the property.

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
There is water quality data available for 3 on-site wells. One well is screened in the overburden, and the other two wells extend into the bedrock.

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides		x	PDI Investigation
Organic Compounds	x		PDI Investigation
Metals	x		PDI Investigation
PCBs	x		PDI Investigation
Pesticides	x		PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides	x		Groundwater Investigation
Organic Compounds	x		Groundwater Investigation
Metals	x		Groundwater Investigation
PCBs	x		Groundwater Investigation
Pesticides	x		Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys	x		

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		Groundwater Investigation
Water table fluctuations	x		Groundwater Investigation
Direction of groundwater flow	x		Groundwater Investigation
Radiological Investigation:			
Radon Testing		x	
Exposure Rate or Surface Scan		x	Pre-Design Investigation
Downhole Gamma Logging		x	Pre-Design Investigation

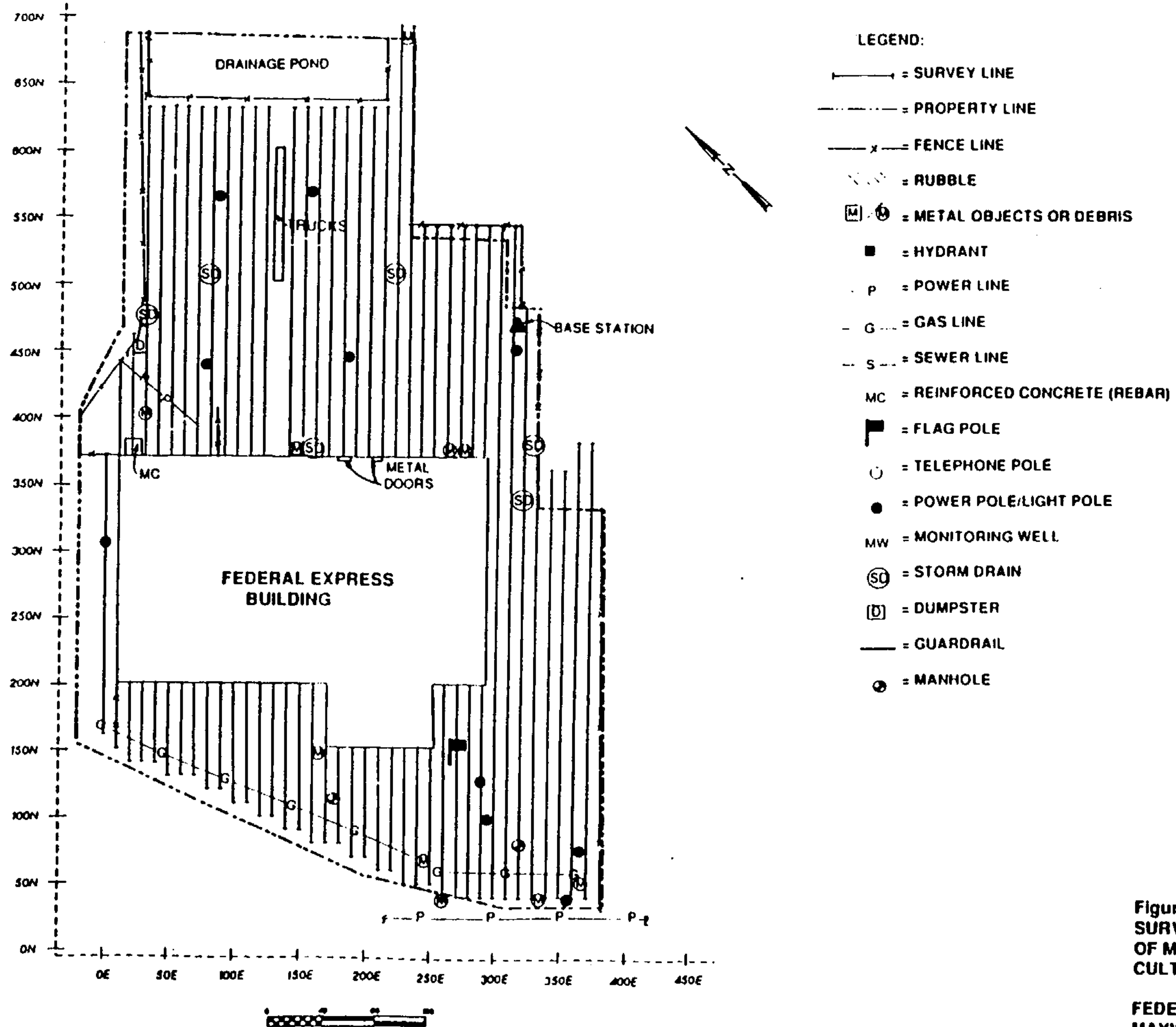

Figure 2
SURVEY GRID AND EXTENT OF MAGNETOMETER SURVEY CULTURAL FEATURES MAP

FEDERAL EXPRESS PROPERTY
MAYWOOD, NEW JERSEY

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

85-101 RT. 17 (former Hunter Douglas and SWS Realty)

A. Description of Property

The 85-101 Rt. 17 property, also known as Hunter Douglas (formerly Hunter Douglas and SWS Realty), is owned by a development company and leased to the following tenants: Architectural Window Manufacturing Corporation, Meta-Lite Custom Fabricators, Firehouse Office, Kentitec Computer, and Computer Service Center. The property occupies approximately 4.7 acres, slopes gently from the southeast to the north and west, and consists of a 96,000 square foot cinder block and brick veneer office building with grassy areas to the west and a bituminous concrete driveway to the east. The property is bordered to the east by the DeSaussure property and a former or buried drainage channel which runs east-west off the north-east corner of the existing office building. The property is bordered to the south and west by the Federal Express property and Route 17, respectively. To the north, the property is bordered by Sears (M-122).

The Meta-Lite company occupies the southern third of the building and is engaged in the machining, fabrication, and painting of highway signs and toll booths. The company operates 8 to 9 hours per day, 5 days per week. Meta-Lite, Inc. is classified as a large quantity generator (EPA ID NJD982274243). Information regarding the operations of the other tenants is not available. Two former tenants included Mark Correctional, Inc. and PC Warehouse. Mark Correctional, Inc. formerly occupied the center third of the former Hunter Douglas building and was engaged in the fabrication and sales of self-contained cells for correctional facilities. PC Warehouse was engaged in the manufacture, sales, and repair of personal computers (M-698).

B. Site-Specific Geology

Based on the 15 boreholes drilled to a maximum depth of 15 feet below grade, the site is underlain by fill materials and the Brunswick Sandstone. Approximately 4 to 8 feet of dark reddish brown fine-grained silty sand overlies reddish brown fine-grained sandstone. The top of bedrock varies from 0.75 feet to 11 feet below grade across the site with the depth to sandstone decreasing in the east section of property. In the west, approximately 2 feet of a black organic silt (cumulous soil) and peat covers decomposed sandstone at depths of 5 to 6 feet. A man-made drainage ditch along the east property boundary intercepts southward moving groundwater (M-122)

Two additional boreholes (C25 and C-34) were drilled during the CH2MHill remedial investigation (M-575), confirming the findings of the Bechtel investigation described above.

C. Site Specific Geophysical

A surface geophysical survey (using a magnetometer) and test pit program was performed by CH2MHill in December/January 1991-1992. The survey was conducted as part of the remedial investigation to identify areas of buried metal, which may have been potential sources of chemical contamination. Geophysical anomalies were identified on the east and west sides of the existing building. Eleven (11) test pits were excavated to approximately 10 feet to determine the source of the anomalies. Buried one inch electric utilities were uncovered in TP-67 and 69 located on the east side of the existing building. Scrap and sheet metal were observed in TP-65, 66, and 68 also located on the east side of the existing building. No metal was observed in TP-62 and 63 located along the west side of the existing building or TP-64 located along the east side of the building (M-575).

D. Site-Specific Geotechnical

No geotechnical information was located for this property.

E. Site-Specific Hydrogeology

Depth to the water table ranged from 0.5 feet to 8 feet below existing grade based on borehole information only. Groundwater levels are shallow adjacent to the drainage ditch but drop off rapidly to the west and south. Groundwater flows generally southward (M-122). No other hydrogeologic information was located.

F. Civil/Survey Information

No Civil/Survey information was located for this property.

G. Underground Utilities

Electric utilities exist at the site as observed during the geophysical surveys. No other utility information was located for this property.

H. Previous Investigations (Radiological)

Radiological data were presented by BNI in Radiological And Limited Chemical Characterization Report for the Hunter Douglas Property (M-122, July 1987). It describes their investigation, which consisted of outdoor exposure rate measurements with a 2" x 2" sodium iodide coneshielded gamma detector and collection of sediment samples for thorium, radium and uranium analysis. Fourteen boreholes were installed (from 4-15 feet) and downhole gamma count rate data were collected.

The three sediment samples collected contained ^{232}Th concentrations of 3.2, 5.4, and 33.4 pCi/g. Significantly less ^{226}Ra and ^{238}U concentrations were present, although the radium concentration did reach 4.6 pCi/g in one of the samples. The sample data indicated contamination along the drainage ditch which stretches across the eastern property boundary.

Downhole gamma logging data did not indicate any subsurface contamination. However, no boreholes were installed in the area where the sediment samples were collected due to heavy undergrowth; more accessible adjacent properties had been shown to have contamination along the ditch to depths of five feet, and it was assumed that the ditch on this property was also contaminated to five feet below the ground surface. As shown on the attached figure, in addition to the ditch, BNI indicated surface contamination along the western portion of the property between the building and Route 17. No data were provided to support this conclusion. Surface and near-surface gamma count rates were not elevated in boreholes installed in this area.

Document M-698 contains indoor radon and exposure rate data collected at this property. All radon samples contained less than 0.5 pCi/L. Interior exposure rate measurements were within the range due to natural background. Exterior exposure rate measurements ranged from 8.6-15.6 μR/h. The maximum exposure rate was measured in a portion of a parking lot not believed to be contaminated. The slightly elevated reading was attributed to the radioactivity in the granitic material mixed with asphalt.

I. Previous Investigations (Environmental)

A limited chemical characterization of the property was performed during the radiological investigation (M-122). One composited sample was collected from one borehole to a maximum depth of 16 feet. This sample was analyzed for VOCs, base neutral/acid extractables, pesticides/PCBs, priority pollutant metals, and EP toxicity. No VOCs, PCBs, or pesticides were detected in the sample. The semi-volatiles, naphthalene (80 ppb), 2-methylnaphthalene (88 ppb) and bis (2-ethylhexyl) phthalate (30 ppb) were detected in the composite sample. Priority pollutant metals analysis results indicated the presence of cadmium, with a concentration above background (M-122).

A limited environmental investigation was performed by CH2MHill in 1991. Two borings (C-25 and C-34) were advanced to approximately 11 feet below grade. Soil boring C-25 was located east of the existing building in the former drainage channel and near the former UST that was removed in 1991. Soil boring C-34 was located west of the existing building in an effort to provide areal coverage of the site during the RI investigation. Two monitoring wells (BRMW8 and OBMW8) were also located along the west property line. Samples were submitted for TCL organics, TAL inorganics, caffeine, d-limonene, a-pinene, and lithium. Based on the results of analytical testing, total VOCs (from benzene and xylene) exceeded the 1,000 ppb NJDEPE guidance value in three samples from boring C-25. The highest total VOC concentration (337,700 ppb) was detected in the 8.5 to 10.5 foot soil interval. High concentrations were also detected in the 4.5 to 6.5 foot soil interval (32,660 ppb) and the 0.5 to 2.5 foot soil interval (7,960 ppb). Gasoline odors and above background PID headspace readings were also observed from boring C-25. TCL Semi-VOCs (PAHs) also exceeded the 10,000 ppb NJDEPE guidance value in boring C-25 in the 8.5 to 10.5 soil interval (24,512 ppb) (M-575).

Caffeine, d-limonene, a-pinene, and lithium were not detected in any of the soil samples. Inorganics, arsenic, cadmium, chromium, lead, and beryllium were detected in soil samples from borings C-25 and C-34. Arsenic, chromium, and beryllium were detected at concentrations below the NJDEPE guidance values. Cadmium was detected in soil boring C-25 only in the 0.5 to 2.5 foot soil horizon at 1.4 ppm, slightly above the NJDEPE guidance value of 1 ppm. Lead was also detected in soil boring C-34 at 204 ppm in the 1 to 3 foot soil horizon, which was greater than the 100 ppm NJDEPE guidance value (M-575).

J. Summarize Data Gaps

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil to be acquired for the pilot study.

Geophysical Data - A geophysical survey (magnetometer survey) was performed in 1991-1992. However, additional data may be needed in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data- Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - Some site-specific hydrogeological data is available; however, it does not constitute a site-wide hydrogeological characterization. It may be necessary to obtain additional hydrogeological data in order to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Environmental Data - Some chemical data exists for site soil; however, this data is not sufficient to characterize site soils and groundwater for design (including disposal) and health and safety purposes.

References

M-122, Radiological and Limited Chemical Characterization Report for the Hunter Douglas Property, Bechtel National, Inc., July 1987.

M-575, Maywood Chemical Company Site, Final Remediation Investigation Report, CH2M Hill, November 1994.

M-698, Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site, Bechtel National, Inc., August 1994.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Former Hunter Douglas and SWS Realty

Property Address: 85-101 Rt. 17

County/State: Borough of Maywood, County of Bergen, New Jersey

Property Use:

Company Name: Meta-Lite, Architectural Window; Computer Service Center

Company Contact Name : Victor DeLucia

Company Contact Address/Phone No. (201) 939-3333

Current Property Use: Meta-Lite is a manufacturer of highway signs; Architectural Windows installs windows; and Computer Service Center provides computer services

Hours of Operation: Approx. 6:00 am to 6:00 pm., with half days on Saturdays.

Past Uses: Mark Correctional, Inc. formerly occupied the center third of the former Hunter Douglas building and fabricated and sold self-contained cells for correctional facilities. PC Warehouse was engaged in the manufacture, sales, and repair of personal computers

Property Description:

Lot Size: Lot 1, Block 240; approximately 4.7 acres

No. of Buildings :1

Building(s) size (each): approximately 96,000 square feet

Year built: 1965

Zoning: Commercial

Uses of Adjacent Properties:

North:	Sears property
East:	DeSaussure property and former drainage channel
South:	Federal Express property
West:	N.J. Rt. 17

Nearest structure on adjacent properties and each side of site boundary:
North (Sears property and buildings);
East (DeSaussure Building) and drainage channel,
South (Federal Express building)
West (N.J. Rt. 17).

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property?Unknown

Type of equipment: __________

Equipment ID No.: __________

Installation Date: __________

Labels: __________

Fluid volume: __________

Is there any secondary containment?
Unknown

Is any of the equipment leaking or damaged? If so, describe:
Unknown

Is there any known history of leaks or discharges?
Unknown

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Former UST near on northern portion of property (removed).

	Tank 1	Tank 2	Tank 3
Tank capacity:	Unknown		
Substance Stored:	Gasoline		
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:
NA

Were there past operations conducted on the property that required the use of USTs? If so, describe: former gasoline UST (removed 1991)

Are there any USTs removed from service, but left in the ground?
(See above)

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).Unknown

Any history of leak or discharge from ASTs?
Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: Meta-Lite is a large quantity generator; Meta-Lite's EPA ID is NJD982274243

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste

(Includes biological or medical)

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds	x		Limited, (M-122, Stephan RI, 1994)
Metals	x		Limited, (M-122, Stephan RI, 1994)
PCBs	x		Limited, (M-122, Stephan RI, 1994)
Pesticides	x		Limited (M-122, Stephan RI, 1994)
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	Groundwater Investigation
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys	x		(Stephan RI, 1994), PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification	x		PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction			PDI Investigation
Specific Gravity			PDI Investigation
Consolidation			PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		Borehole information only
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

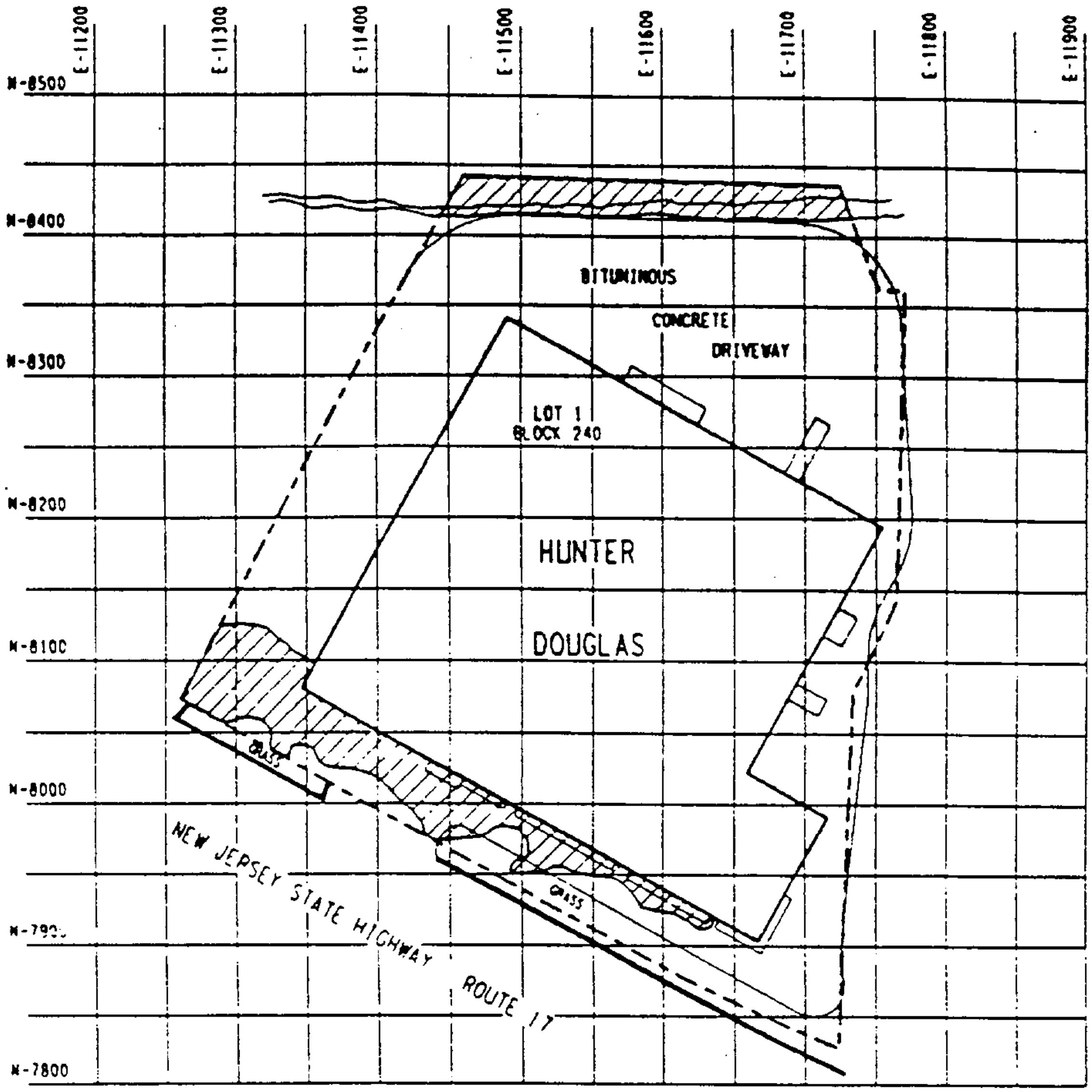

FIGURE 3-2 AREAS OF SURFACE CONTAMINATION AT THE HUNTER DOUGLAS PROPERTY

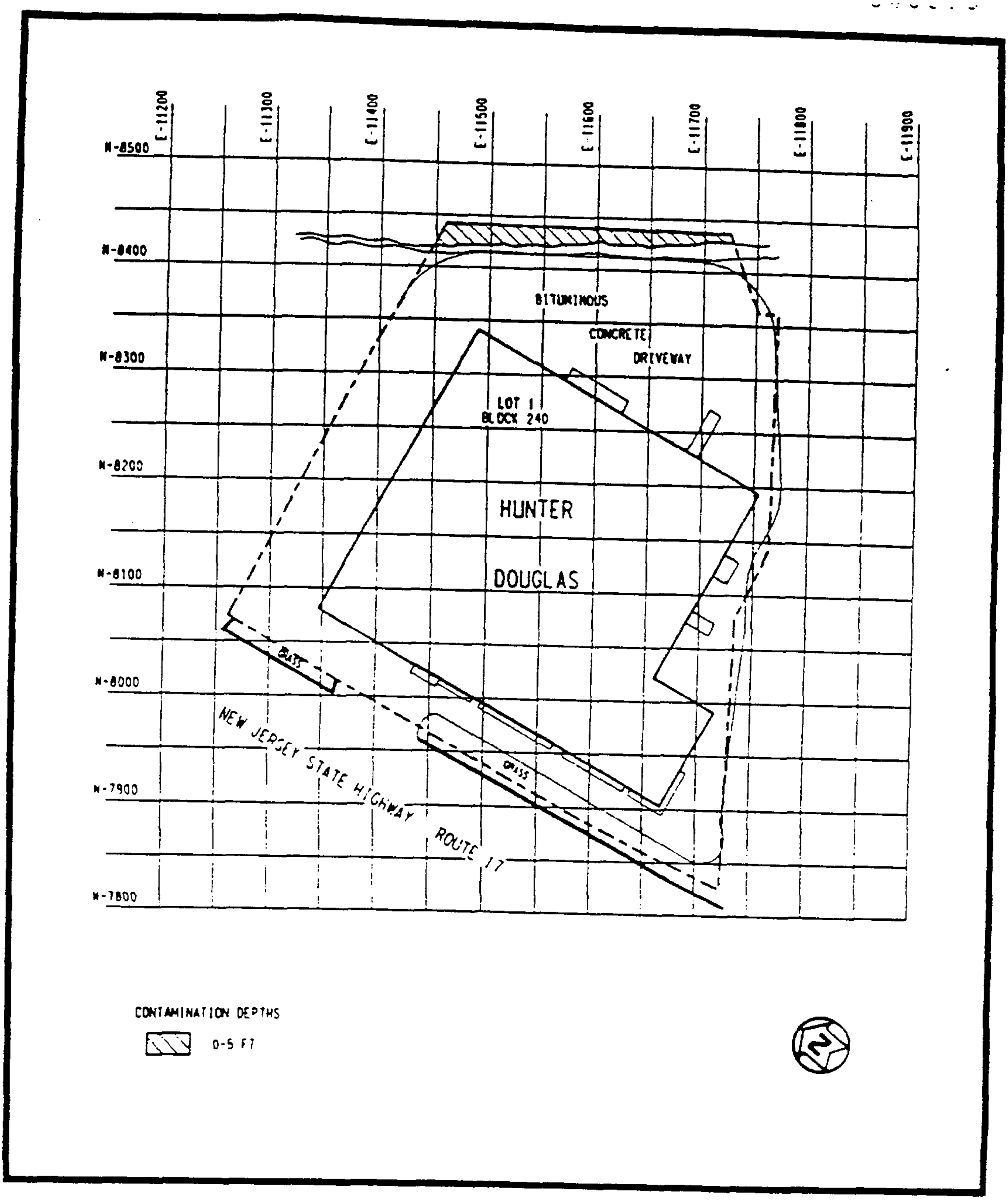

FIGURE 3-3 AREA OF SUBSURFACE CONTAMINATION AT THE HUNTER DOUGLAS PROPERTY

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

137 RT. 17 (Former Federal Express; Current Uniform Fashions)

A. Description of Property

The Uniform Fashions property is located at 137 Route 17 North in Maywood, Bergen County, New Jersey. The site is approximately 1.5 acres and contains one cinder block and brick veneer building. The building contains a retail store used for ordering and sales of uniforms for waiters/waitresses and nurses. The front portion of the building contains offices, a small storage area, and a retail showroom. The rear of the building is the warehouse for merchandise. The remaining area of the property is covered by asphalt pavement (M-698).

The northern side of the property is bordered by an aboveground section of the Lodi Brook. Other commercial properties lie to the north (Sunoco), east (Sears), and south (SWS). The property is bounded by New Jersey Route 17 on the west. A drainage ditch also exists along the eastern boundary of the property (M-121).

Working hours begin at 7:00 am and finish at 9:00 pm. There are weekend hours also (unknown).

B. Site-Specific Geology

The Uniform Fashions property is located in northeastern New Jersey within the glaciated section of the Piedmont Plateau. The topography of the site is essentially flat (total measured relied of 2.0 ft) with the lowest elevation in the southwest (44.2 ft m.s.l.) and the highest in the northeast (maximum elevation of 46.2 ft m.s.l.). Based on limited borehole information, the site is underlain by fill materials and light brown fine-grained silty sand from 1.5 feet to approximately 10 feet below existing grade. Above these materials is the asphalt roadway and silt and crushed rock. The top of the weathered bedrock was observed from approximately 6 to 13 feet below existing grade and consisted of a pale-yellowish to dusky red weathered sandstone (Brunswick sandstone). The site-specific geology is based upon five boreholes advanced to a maximum depth of 13 feet below existing grade (M-121).

C. Site Specific Geophysical

A surface geophysical survey (using a magnetometer) and test pit program was performed by CH2MHill in November 1991. The survey was conducted as part of the remedial investigation to identify areas of buried metal, which may have been potential sources of chemical contamination. Test pits were subsequently excavated in anomalous areas. The purpose of the test-pit program was to visually investigate anomalous areas of potential buried metal identified during the surface geophysics survey. Five (5) test pits were excavated to 10 feet below grade at the Uniform Fashions property. Test pits were excavated on the west side of the existing building. No buried metal objects or drums were observed in the test pits (M-575).

No other geophysical surveys were found.

D. Site-Specific Geotechnical

No geotechnical laboratory information was found.

E. Site-Specific Hydrogeology

Groundwater levels measured in boreholes only ranged from 4 to 6 feet below existing grade (M-121). No other hydrogeologic information was found.

F. Civil/Survey Information

No civil/survey information was found.

G. Underground Utilities

Two former USTs (fuel oil and gasoline tanks) of unknown capacity were removed from service in 1991 (EDR, 1999). No other information regarding underground utilities was found.

H. Previous Investigations (Radiological)

Radiological data was presented by BNI in The Radiological Characterization Report for Federal Express Property, M-121, DOE/OR/20722-154, July, 1987). It describes their investigation, which consisted of outdoor exposure rate measurements with a 2" x 2" sodium iodide coneshielded gamma detector and collection of one sediment sample for thorium, radium and uranium analysis. Boreholes were installed and downhole gamma count rate data were collected.

Exposure rate measurements found potential surface contamination along the drainage ditch which runs the length of the eastern section of the property. This area can be seen on the attached figure. Exterior exposure rate data presented in M-698 ranged from 8.6-19.6 μR/h (six measurements); interior exposure rates ranged from 8.7-10 μR/h (five measurements). The elevated exposure rates were found in the location of the drainage ditch.

No surface soils were collected due to the presence of heavy undergrowth on the property. One sediment sample was collected from the drainage ditch. It had a ^{232}Th concentration of 7.7 pCi/g. The ^{226}Ra and ^{238}U concentrations were not elevated.

The subsurface investigation consisted of installation and gamma logging of five boreholes. The data did not indicate subsurface contamination exceeding the commercial use criteria of 15 pCi/g for the sum of radium and thorium. However, a review of data collected on adjacent properties (in the drainage ditch) indicated the potential for subsurface contamination to approximately 5 feet.

Document M-698 also contains indoor radon data collected at this property. Eleven radon samples were collected; radon concentrations ranged from less than 0.2-0.3 pCi/L.

I. Previous Investigations (Environmental)

A limited environmental investigation was performed by CH2MHill in 1991. One boring (C-22) was drilled adjacent to the north-west corner of the existing building. The boring was located in this area based on historical aerial photographs which suggested the potential for soil contamination in this area. Analytical samples were collected from 1 to 3, 3 to 5, and 5 to 7 feet below grade. Samples were submitted for TCL organics, TAL inorganics, caffeine, d-limonene, a-pinene, and lithium. Based on the results of analytical testing, the maximum total VOC concentration was 3 ppb (5-7 feet below grade). The maximum total semi-volatile concentration was 310 ppb (3-5 feet below grade) and the total semi-volatile concentrations (non-PAHS) was 54 ppb (3-5 feet below grade). Caffeine and d-limonene or pesticides were non detected. Inorganics were detected in various samples including arsenic, cadmium, chromium, lead, and beryllium. Lithium was not detected in any of the samples (M-575).

J. Summarize Data Gaps

Historical - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil to be acquired for the remedial design.

Geophysical Data - Some geophyscial data (magnetometer) work has been performed at the site. However, additional data may be needed to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - Some site-specific hydrogeological data is available; however, it does not constitute a site-wide hydrogeological characterization. It may be necessary to obtain additional hydrogeological data in order to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Environmental Data - Some limited chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Workplan.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

References

M-121, Radiological Characterization Report for the Federal Express Property, Bechtel National, Inc., July 1987.

M-575, Maywood Chemical Company Site, Final Remediation Investigation Report, CH2M Hill, November, 1994.

M-698, Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site, Bechtel National, Inc., August 1994.
Environmental Radius Report, Environmental Data Resources, Inc., March, 1999.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Former Federal Express, Current Uniform Fashions

Property Address: 137 Rt. 17

County/State: Borough of Maywood, County of Bergen, New Jersey

Property Use:

Company Name: Uniform Fashions (tenant); AMP Realty (owner)

Company Contact Name: Thomas Bloomer (Engineer), Victor DeLucia

Company Contact Address/Phone No.: (201) 291-9400, (201) 939-3333

Current Property Use: Retail/warehouse; sales of uniforms for waiters/waitresses, nurses, etc.

Hours of Operation: Approx. 7 a.m. to 9 p.m. Weekend hours also.

Past Uses: Federal Express, AMP Realty

Property Description:

Lot Size: Lot 1-A, Block 240; approximately 1.5 acres

No. of Buildings :1

Building(s) size (each):Approximately 16,000 square feet

Year built: Unknown

Zoning: Commercial

Uses of Adjacent Properties:

North:	Above-ground section of Lodi Brook and Sunoco property
East:	Sears and Drainage Ditch
South:	former Hunter Douglas and SWS Realty;
West:	New Jersey Rt. 17

Nearest structure on adjacent properties and each side of site boundary:
North (Sunoco Building),
South (SWS/Hunter Douglas Building),
East (drainage ditch),
West (Rt. 17).

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ______
Equipment ID No.: ______
Installation Date: ______
Labels: ______
Fluid volume: ______

Is there any secondary containment?

______

Is any of the equipment leaking or damaged? If so, describe: ______

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Two former USTs removed from service (M-575, CH2M Hill). The USTs were located adjacent to the western wall of the building.

	Tank 1	Tank 2	Tank 3
Tank capacity:	Unknown	10,000 Gal	
Substance Stored:	Fuel Oil	Gasoline	
Installation Date:			
Registration (Y/N)			
Corrosion protection		Yes	
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe: Unknown

Were there past operations conducted on the property that required the use of USTs? If so, describe: Two former USTs removed from service in 1991 (AMP); former fuel oil tank and gasoline tank of unknown capacity

Are there any USTs removed from service, but left in the ground? (See above)

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).Unknown

Any history of leak or discharge from ASTs? Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Hazardous Waste Storage and Disposal

EPA Identification number for site: NA

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Community Water Supply System

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides		x	PDI Investigation
Organic Compounds	x		CH2MHill, 1994, limited
Metals	x		CH2MHill, 1994, limited
PCBs	x		CH2MHill, 1994, limited
Pesticides	x		CH2MHill, 1994, limited
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	PDI Investigation
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys	x		CH2MHill, 1994

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification	x		PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction			PDI Investigation
Specific Gravity			PDI Investigation
Consolidation			PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan		x	Minimal Data Available; PDI Investigation
Downhole Gamma Logging		x	Minimal Data Available; PDI Investigation

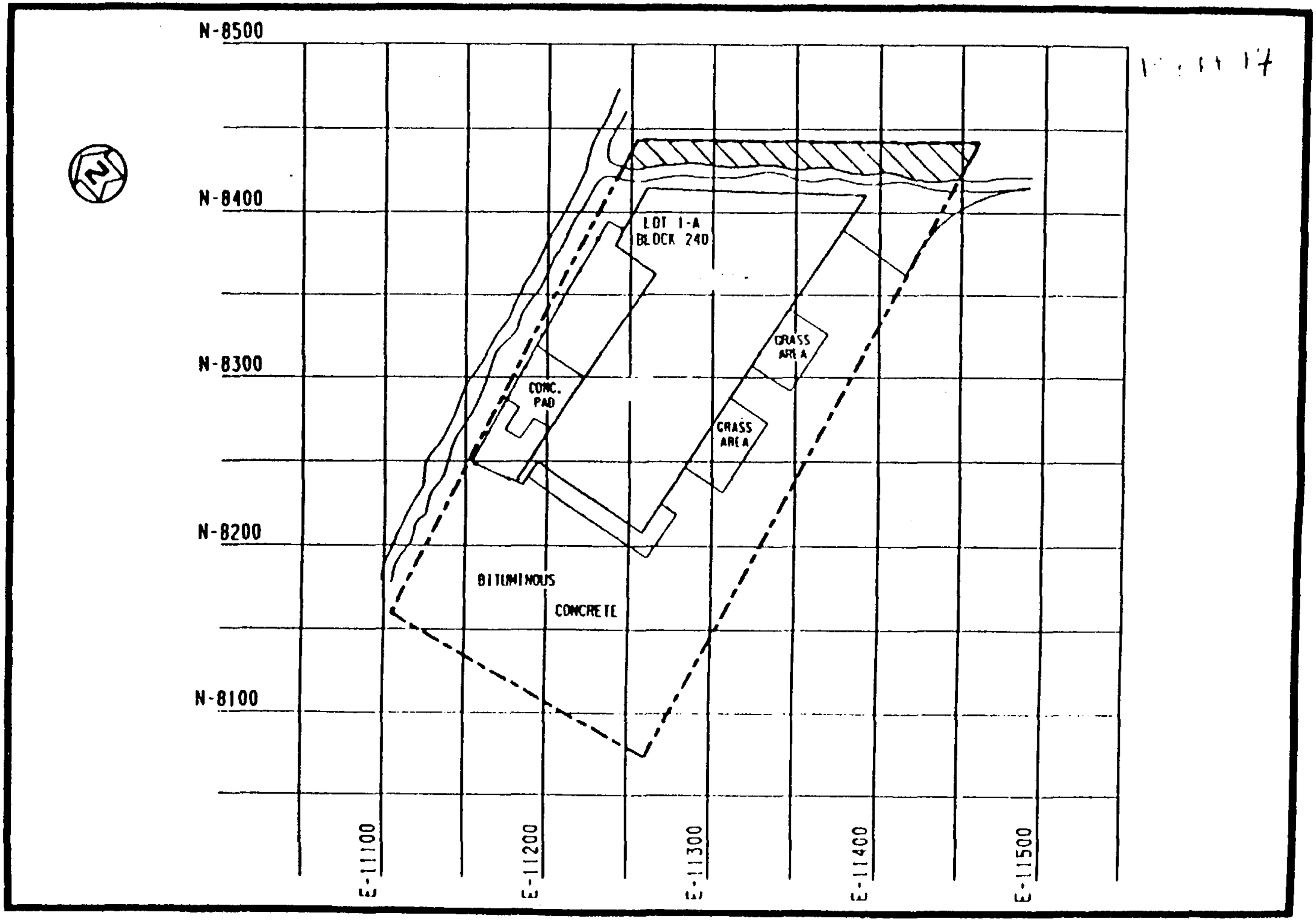

FIGURE 3-3 AREA OF SUBSURFACE CONTAMINATION AT THE FORMER FEDERAL EXPRESS PROPERTY

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

167 RT. 17 (Sunoco Station)

A. Description of Property

The 167 Rt.17 (Sunoco Station) property is located in a commercial business area on Rt. 17 North in Maywood, County of Bergen, New Jersey. The property, which is currently inactive, is approximately 1.7 acres and contains a gasoline service area and a single-story 800 square foot cinder block building. The gasoline service area contains two concrete pads and gas pumps. An existing waste oil UST (capacity unknown) exists on the west side of the existing building. Three (3) former USTs containing gasoline were located south of the existing building (Remedial Investigation Plan, February, 1999)

The property is bordered to the southeast by an open drainage ditch of Lodi Brook which is though to be the primary mechanism for the transport of radioactive contamination found on the property (M-698). The Uniform Fashions property (AMP) also borders the property to the south. To the west, the property is bordered by Rt.17. The property is bordered to the north by the Gulf property and to the east by the Sears property. The area adjacent to Rt.17 is covered by asphalt pavement, and the remaining property is covered by packed gravel, clay, and some concrete. The southern portion of the property contains gasoline tanks and natural gas and sewer lines covered by asphalt and concrete. A drainage conduit exists along the northwestern property boundary and extends under Rt 17.

B. Site-Specific Geology

The 167 Rt 17 property is located in northeastern New Jersey within the glaciated section of the Piedmont Plateau. The topography is generally flat with minor relief. Stratigraphy at the site consists of fill materials and decomposed sandstone of the Brunswick Formation. Approximately 90 percent of the area was once a wetland environment characterized by a saturated, black organic silty soil on top of decomposed sandstone (dark yellowish brown grading to dark reddish brown at depth). Fill materials consist of mostly disturbed residual soil and reddish glacial alluvium from 1 to 6 feet below grade. During development of the property, some of the black organic silt lens were mechanically moved form the center of the property to cover the northwestern conduit to create levees for the open southern drainage. A thicker sequence of sandy fill was then used as the foundation subgrade materials in the central portion of the property. (M-123).

C. Site Specific Geophysical

A surface geophysical survey (using a magnetometer) was performed by CH2MHill in October 1991 (M-575). The survey was conducted as part of the remedial investigation to identify areas of buried metal, which may have been potential sources of chemical contamination. Fifteen areas of buried metal were identified at the site. Based on the results of the survey, 11 test pits were excavated at the Sunoco property. No drums were found in any of the test pits. No other information regarding geophysical work was found.

D. Site-Specific Geotechnical

No geotechnical information was located.

E. Site-Specific Hydrogeology

Depth to the water table varies from 4.0 ft to 6.5 ft based on observations during installation of soil borings only (M-123). No other hydrogeological information was located.

F. Civil/Survey Information

No surveys were located for this site.

G. Underground Utilities

Limited information regarding underground utilities was located for this property. Utilities such as gas lines and stormwater conduits have been reported to exist in the southern section of the property (M-123). One waste oil UST (capacity unknown) and 3 former gasoline USTs (capacity unknown) have also been reported to exist at the site (M-575).

H. Previous Investigations (Radiological)

Radiological data was presented by BNI in The Radiological And Limited Chemical Characterization Report for the Sunoco Station Property (M-123, July 1987). It describes their investigation, which consisted of outdoor exposure rate measurements with a 2" x 2" sodium iodide coneshielded gamma detector and collection of sediment samples for thorium, radium and uranium analysis. Eight boreholes were installed (to 7-9 feet in most cases) and downhole gamma count rate data were collected.

Thorium-232 concentrations exceeded 5 pCi/g in two sediment samples, with a maximum of 7.6 pCi/g. Radium-226 and ^{238}U concentrations were not elevated. Surface contamination was identified along the drainage ditch which stretches across the southern property boundary.

Downhole gamma logging data indicated that subsurface contamination exists over approximately 80-90 percent of the property, as shown on the attached figure. The depth of contamination varied from 1-5 feet, although contamination was found to at least three feet in most of the boreholes placed on the property.

Document M-698 contains indoor radon and exposure rate data collected at this property. Two radon samples were collected; radon concentrations were less than 0.2 and less than 0.3 pCi/L. One thoron samples resulted in less than 1.0 pCi/L. An interior exposure rate measurement recorded 9.6 μR/h and four exterior exposure rate measurements ranged from 7.7-8.5 μR/h; all of these readings reflect natural background.

I. Previous Investigations (Environmental)

A limited chemical characterization of the property was performed during the radiological investigation (M-123). One composite sample from a maximum depth of 16 feet was collected from one borehole location, located north of the existing building. The sample was analyzed for VOCs, BNAE, priority pollutant metals, pesticides, and PCBs, and EPA-specified hazardous waste characteristics. The results of sampling indicated no detectable concentrations of base neutral/acid extractables, pesticides, and PCBs. One VOA, (methylene chloride), was detected, but the concentration was below the laboratory's detection limit. One priority pollutant metal, cadmium, was detected at 2 ppm and exceeded the range of background soil (0.01 to 0.7 ppm). In addition, the sample did not exhibit hazardous waste characteristics (M-123).

A limited chemical characterization of the property was also performed by CH2MHill in 1991 though 1993. Three soil boring (C-11, C-15, and C-33) were drilled on the property to a maximum depth of 10 feet below existing grade. C-11 was located north of the existing building in a former drainage channel. C-15 and C-33 were located south of the existing building and placed based on aerial photographs and near locations of former USTs. One bedrock monitoring well (BRMW5) and one overburden monitoring well (OBMW5) were also installed in June 1992 at the west property line. Samples were submitted for TCL organics, TAL inorganics, caffeine, d-limonene, a-pinene, and lithium. Based on the results of analytical testing, the maximum total VOC concentration was 849 ppb (C-15, 3-5 feet). The maximum semi-volatile concentration was also detected in C-15 from the same depth interval (4,278 ppb). Non-PAHs exceeding 1,000 ppb (NJDEP guidance level) were detected in two borings C-15 and C-33 at concentrations of 2,660 ppb and 1,450 ppb (1-3 feet) and 1,449 ppb (7-9 feet), respectively. The most frequently detected non-PAH was bis(2-ethylhexyl) and di-n-butyl phthalate. Caffeine and d-limone and pesticides were not detected in any of the samples. Inorganics were detected in various samples including arsenic, beryllium, cadmium, chromium, lead, and lithium. The maximum detected concentration of arsenic, cadmium, and chromium was detected in boring C-15 from 3-5 feet below grade. Arsenic, cadmium, and chromium was detected at 13.9 ppm, 2.6 ppm, and 223 ppm, respectively. Cadmium exceeded the NJDEP clean-up criteria of 1 ppm in two borings (C-15, 3-5 feet, 2.6 ppm) and C-33 (1.4 ppm (3-5 feet). Lead exceeded the 100 ppm NJDEP clean-up criteria in one boring (C-11) at 30.1 ppm (3-5 feet). Lithium was not detected in any of the samples (M-575)

J. Summarize Data Gaps

Historical- Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data- Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remedation design.

Geophysical Data- A geophysical survey (magnetometer) was conducted. However, additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeologic Data- Some site-specific hydrogeological data is available from borehole information only; however, it does not constitute a site-wide hydrogeological characterization. It may be necessary to obtain additional hydrogeological data in order to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data- No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data- Not detailed maps showing locations of underground utilities are available.

Radiological Data- In-situ surface and downhole gamma spectroscopy data are needed to support design to supplement the existing data regarding the depth of contamination. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data- Some chemical data exists for site soil; however, this data is not sufficient to characterize site soils for design (including disposal) and health and safety purposes.

References

M-123, Radiological and Limited Chemical Characterization Report for the Sunoco Station Property, Bechtel National, Inc., July 1987.

M-575, Maywood Chemical Company Site, Final Remediation Investigation Report, CH2M Hill, November, 1994.

M-698, Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site, Bechtel National, Inc., August, 1994.

Remedial Investigation Proposed Sampling Plan, New Jersey State Highway Route 17 at Essex Street, Maywood, New Jersey, February, 1999.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Sunoco Station

Property Address: 167 Rt. 17

County/State: Borough of Maywood, County of Bergen, New Jersey

Property Use:

Company Name: Sunoco Station

Company Contact Name : Russell Hammond

Company Contact Address/Phone No.: (215) 977-4918

Current Property Use: Service Station

Hours of Operation: 7 days a week, 24 hours per day

Past Uses: Service Station

Property Description:

Lot Size: Lot 1-C, Block 240; 1.7 acres

No. of Buildings : Single-story building and gasoline service area

Building(s) size (each): Approximately 800 square feet

Year built: 1961

Zoning: Commercial

Uses of Adjacent Properties:

North:	Gulf Building
East:	Sears and Lodi Drainage
South:	Uniform Fashions (AMP) and Open Drainage Ditch
West:	N.J. Route 17

Nearest structure on adjacent properties and each side of site boundary:
North (Gulf Building); East (Sears and Lodi Drainage); South (Uniform Fashions Building and Open Drainage Ditch; West (N.J. Route 17).

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ________

Equipment ID No.: ________

Installation Date: ________

Labels: ________

Fluid volume: ________

Is there any secondary containment?

Is any of the equipment leaking or damaged? If so, describe:

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Yes; 1 existing waste oil tank and 3 former gasoline USTs.

	Tank 1 (3 tanks, removed)	Tank 2	Tank 3
Tank capacity:	6000 Gal	550 Gal	
Substance Stored:	Gasoline	Waste Oil	
Installation Date:	1979	1958	
Registration (Y/N)	Y	Y	
Corrosion protection	Fiberglass-reinforced plastic	Bare Steel	
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? Yes; LUST incident reported as of 9/1/97 (EDR)

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe: Yes, the property is currently a gasoline station and contains USTs.

Were there past operations conducted on the property that required the use of USTs? If so, describe: Yes, the property was a gasoline service station.

Are there any USTs removed from service, but left in the ground? 3 former USTs (unknown capacity) removed from service.

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). Unknown

Any history of leak or discharge from ASTs? Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: NA

Describe condition of containers (is there any corrosion or leakage?)
NA

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Hazardous Waste Storage and Disposal

EPA Identification number for site: NA

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
NA

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Water and Wastewater

Are there any sanitary or septic system on the site?
NA

Note source of water for the site, and identify on-site wells
Municipal water supply

Note if site falls within floodplain, describe direction of runoff.
Topographic depression marks the site's northwestern boundary. A buried conduit drains the western section of the property immediately north and east of the Sunoco Station property. The depression acts as a sump for surface water.

Note if any water quality data is available for on-site wells.
NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		X	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides		x	
Organic Compounds	x		Limited (1 borehole-composited sample), July 1987; Methylene chloride detected only (M-122); Limited investigation (Stephan RI, 1994)
Metals	x		Arsenic, cadmium, chromium, lead, beryllium (Stephan RI, 1994)
PCBs	x		None detected (M-122 and Stephan RI, 1994)
Pesticides	x		None detected (M-122 and Stephan RI, 1994)
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	PDI Investigation
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys	x		Stephan RI, 1994
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification	x		Limited boring logs available
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	PDI Investigation
Water table fluctuations		x	PDI Investigation
Direction of groundwater flow		x	PDI Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

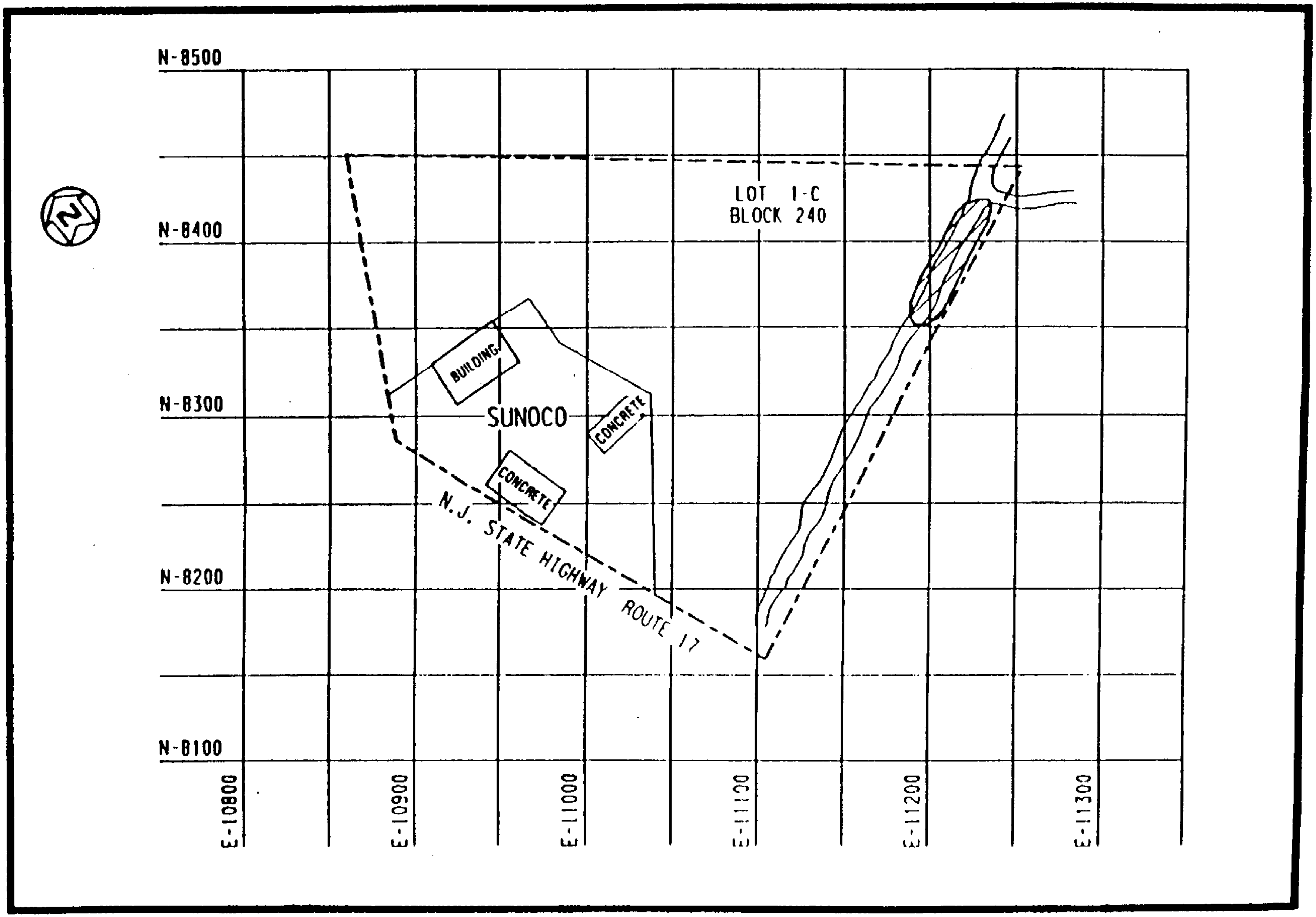

FIGURE 3-2 AREA OF SURFACE CONTAMINATION AT THE SUNOCO STATION PROPERTY

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

239 RT. 17 NORTH (Gulf Service Station)

A. Description of Property

The 239 Rt. 17 North site is located in Lodi, New Jersey, in Bergen County. It is bordered on the north by the 149-151 Maywood Avenue property (Sears Distribution Center), on the southwest by 200 Rt. 17 North property (Sears Truck Repair), and on the southeast by 167 Rt.17 North (Sunoco) property, and on the northwest by an unknown property. The lot size is approximately 0.4 acres and is covered by one building and asphalt. There is a small unpaved area located along the southeast edge of the property. The site is currently an active Gulf Service Station owned by Cumberland Farms, and operates 24 hours per day, seven days per week. A 1994 report (M-698) noted that the station employs one person on each work shift.

The building consists of a one-story brick veneer building and two gasoline service islands. The building is approximately 800 square feet and is divided into three sections: a storage room, a center office area, and a maintenance room with a sink and miscellaneous supplies.

B. Site-Specific Geology

Two, 2-inch diameter monitoring wells, installed as a cluster, are located on site on the down-gradient 1/3 portion of the site. Groundwater flow direction is approximately south to south-west. The wells are approximately 12 feet and 30 feet deep. There are no site specific soil descriptions available, however, general descriptions indicate that the of the area consists of approximately 0 to 6 feet of sandy gravel fill, grading to glacial till down to approximately 15 feet. The Brunswick Sandstone is the bedrock formation which underlies this till.

C. Site Specific Geophysical

No geophysical information was located for this property.

D. Site-Specific Geotechnical

No geotechnical laboratory data was located for this property.

E. Site-Specific Hydrogeology

The wells on site indicate that the water table is 5.5 to 6 feet below grade. The pH of the water measured in April 1994 was 7.2 in the shallow well (12 feet) and 7.6 in the deep (30 feet) well. The measured transmissivity is approximately 133 gal/day/ft. No other hydrogeological information was found.

F. Civil/Survey Information

No survey information was found showing topography, or building structural features.

G. Underground Utilities

There is no available data indicating USTs. However, due to the nature of the site it is presumed there is at least one UST on site. No further information was found on the presence of underground utilities.

H. Previous Investigations (Radiological)

Minimal information was available for review. The reference to a Bechtel National radiological characterization report was incorrect; the only available data were found in DOE/OR/21949-385, which is a compilation of exposure rate measurements and radon/thoron measurements collected at 19 commercial and governmental properties. Exterior exposure rate measurements (collected with a pressurized ion chamber) ranged from 9.6 - 14.4 μR/h. The exposure rate inside the building on the property was 10.9 μR/h. The radon concentrations were 1.0 and 1.3 pCi/L and the thoron concentrations were less than 2 pCi/L. Figure 4-10 of the document indicates that approximately 60 percent of the property is affected with either surface contamination or surface and subsurface contamination. It is not clear what this conclusion is based on. In the scope of work prepared for the field demonstration project, the ACE estimated 1,481 cubic yards of contaminated material on the property.

I. Previous Investigations (Environmental)

No investigations have been found on environmental testing.

J. Summarize Data Gaps

Pilot Study Data Gaps:

Historical Data - Historical - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for the pilot study for this site include laboratory data needed for design of the soil washing system.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - Existing data are not sufficient to identify the location of soil containing radionuclides of concern which exceed the cleanup level. It is not known at this time if there exist sufficient volumes of soil to support their use in the pilot study.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Work Plan.

Design Data Gaps:

Historical - See Pilot Study Data Gaps.

Geologic Data - Some site-specific geologic data is available; however, it does not constitute a site-wide soil characterization. It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Geophysical Data - See Pilot Study Data Gaps.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - See Pilot Study Data Gaps.

Civil/Survey Data - See Pilot Study Data Gaps.

Underground Utility Data - See Pilot Study Data Gaps.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - Some chemical data exists for site soil and groundwater; however, these data are not sufficient to characterize site soils and groundwater for remedial design (including disposal) and health and safety purposes.

Two foot-long soil samples should be collected using a standard two-inch O.D. split spoon sampler. Standard Penetration Test protocol of ASTM D 1586 should be followed for collection of split spoon samples. Samples should be obtained at a minimum frequency of every five feet on center, or wherever a change in material type is suspected or observed. Where cohesive soils (e.g. silt, clay, peat) are encountered in areas where excavation support will be needed, undisturbed tube samples should be collected for laboratory determination of strength parameters. Frequency of tubes should be determined by the geotechnical engineer in the field. It is preferable to collect several tube samples within the same boring to develop a strength profile of the cohesive layer within the same borehole. Thus, a number of borings where cohesive soils are expected should be designated as undisturbed sample borings for collection of tubes, particularly in locations where excavation support systems are required.

Geotechnical laboratory tests, such as triaxial compression and consolidation, may be required for design of excavation support systems and geotechnical analyses in association with the excavations, such as stability, settlement and perhaps underpinning. These tests will require collection of undisturbed tube samples of fine-grained cohesive soils. If support systems need to be tied into bedrock for support, compression tests on bedrock core samples may also be required to determine rock strength parameters for design.

Prior to the design of excavation support systems, it will be necessary to obtain information on the support of adjacent structures. A search of as-built foundation plans should be conducted for any on-site structures or adjacent structures potentially affected by the excavations. If this information cannot be obtained, it may be necessary to conduct an investigation program, possibly including test pits to determine foundation conditions beneath each structure, concrete cores to determine foundation thicknesses, etc.

If dewatering is required for excavation, additional monitoring wells may need to be installed within some of the geotechnical boreholes to determine additional hydrogeological parameters.

Hydrogeologic Data - See Pilot Study.

Civil/Survey Data - See Pilot Study above.

Underground Utility Data - See Pilot Study above.

Radiological - A surface walkover exposure rate scan will be conducted at the outset of the field investigation. Surface in situ gamma measurements and hollow measurement tube (push-pipes) placement/in situ gamma spectroscopy data collection are needed to establish the cut lines necessary to limit future excavation to soil containing radionuclides at concentrations which exceed the release criteria developed for the site. The number and locations will be determined following completion of the geostatistical analysis currently underway on the existing data base.

Environmental Data - If available data (including data obtained for pilot study) is insufficient for design, additional samples (soils or groundwater) will be collected for chemical analysis. Determination of location and number of sampling points will be coordinated with geotechnical, radiological, geological, and hydrogeological data needs.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Gulf Oil

Property Address: 239 Route 17 North

County/State: Bergen County, New Jersey

Property Use:

Company Name: Cumberland Farms, Inc.

Company Contact Name : W.D. Howard

Company Contact Address/Phone No.: (770) 984-3085

Current Property Use: Active Gasoline Filling Station

Hours of Operation: 24 Hour Operation 7 Days/week

Past Uses: NA

Property Description:

Lot Size: approximately 0.4 acres

No. of Buildings : One (1) - One Story Brick Building

Building(s) size (each): 800 Square Feet

Year built: NA

Zoning: Commercial

Uses of Adjacent Properties:

North:	149-151 Maywood Ave., Sears Distribution Center
East:	200 Rt. 17 North, Sears Small Truck Repair
South:	200 Rt. 17 North Sears Small Truck Repair
West:	167 Rt. 17 North, Sunoco Service Station

Nearest structure on adjacent properties and each side of site boundary:
NA

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property?

Type of equipment:	NA
Equipment ID No.:	NA
Installation Date:	NA
Labels:	NA
Fluid volume:	NA

Is there any secondary containment?
NA

Is any of the equipment leaking or damaged? If so, describe: NA

Is there any known history of leaks or discharges?
NA

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? *Presumably there is at least one UST since there is an island with a pump, however there is no available data.*

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? NA

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? NA

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:
Yes, this site is an active gasoline filling station operating 24 hours/day.

Were there past operations conducted on the property that required the use of USTs? If so, describe: NA

Are there any USTs removed from service, but left in the ground?
NA

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? NA

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). NA

Any history of leak or discharge from ASTs? NA

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: NA

Describe condition of containers (is there any corrosion or leakage?)
NA

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Hazardous Waste Storage and Disposal

EPA Identification number for site: NA

Hazardous waste stored or generated on site *(Includes biological or medical)*	Quantities:	Disposition of Haz. Waste

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
NA

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
NA

Water and Wastewater

Are there any sanitary or septic system on the site?

NA

Note source of water for the site, and identify on-site wells

NA

Note if site falls within floodplain, describe direction of runoff.

NA

Note if any water quality data is available for on-site wells.

NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		X	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides		x	It's possible that they exist, but we haven't been able to locate the rad. characterization report
Organic Compounds			PDI Investigation
Metals			PDI Investigation
PCBs			PDI Investigation
Pesticides			PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	Groundwater Investigation
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)			PDI Investigation
Constituent concentration as a function of particle size			PDI Investigation
Organic content			PDI Investigation
Moisture content			PDI Investigation
Soil classification			PDI Investigation
Hydrometer Analysis			PDI Investigation
Geotechnical Parameters:			
Atterberg Limits			PDI Investigation
Shear Strength			PDI Investigation
Soil Compaction			PDI Investigation
Specific Gravity			PDI Investigation
Consolidation			PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		
Water table fluctuations			PDI Investigation
Direction of groundwater flow	x		
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging		x	PDI Investigation

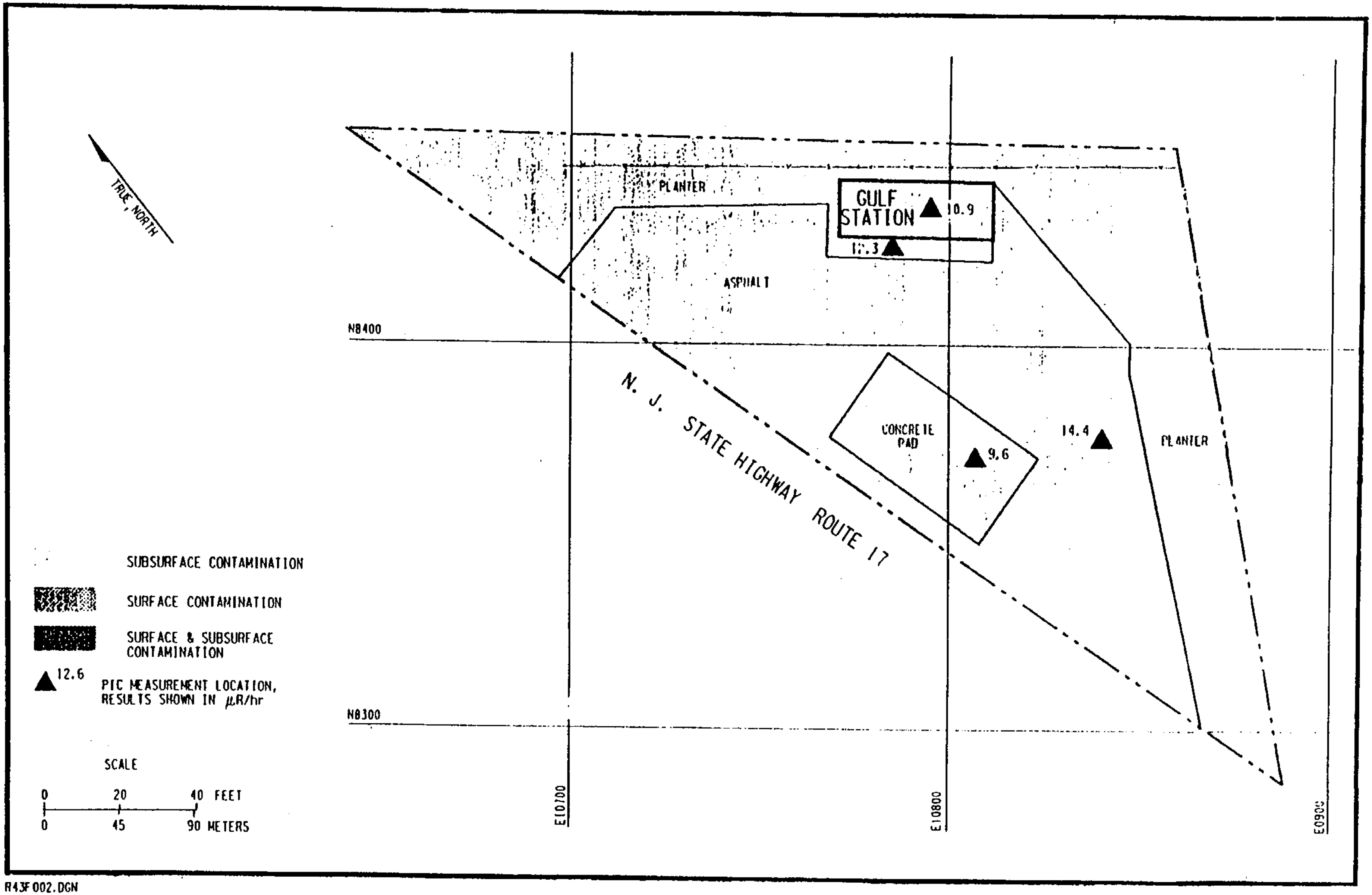

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Figure 4-10
PIC Measurement Locations and Areas of Contamination at the Gulf Station Property 239 Route 17 North

Property Cluster No. 7

- 111 Essex Street (Scanel/Hackensack and Lodi Railroad)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

111 Essex Street (Scanel Property/Hackensack & Lodi Railroad)

A. Description of Property

The Scanel property is a 1.5-acre vacant lot in Maywood, New Jersey. The property is triangular in shape and the point of the triangle on the east side of the property narrows to a width of about 5 feet. The north side of the property borders on the right-of-way to the Hackensack and Lodi Railroad; a single-line spur and a siding are located on this right-of-way. The southern side borders on Coles Brook, which serves as a drainage pathway from Essex Street. The property is located behind a car wash and a Chinese Restaurant on Essex Street. The property is unused.

B. . Site-Specific Geology

Although split-spoon sampling was carried out at seven borehole locations for on-site chemical characterization, there is no record of boring logs having been completed at the site, and none were found to have been included in documents researched for this property.

A general stratigraphic description of the area, taken from the Stepan Final RI Report, 1994, is as follows:

"The area is located within the Piedmont Physiographic Province, also known, in New Jersey, as the Newark Basin. It consists of sandstones, shales, mudstones and conglomerates covered with unconsolidated materials consisting of fill, recent deposits, glacial stratified and unstratified deposits, and soil residual".

C. Site Specific Geophysical

There is no site-specific geophysical information available for this property.

D. Site-Specific Geotechnical

There is no site-specific geotechnical information available for this property.

E. Site-Specific Hydrogeology

No boring logs were found in documents researched; therefore, there is no site-specific hydrogeologic information available for this property.

F. Civil/Survey Information

There is no site-specific civil/survey information available for this property.

G. Underground Utilities

There is no site-specific underground utility information available for this property.

H. Previous Investigations (Radiological)

Radiological data were presented by Bechtel National, Inc. (BNI) in Radiological Survey Report for the Scanel Property, M-111, which is a letter report sent to the USDOE on September 3, 1986. It describes their investigation, which consisted of outdoor exposure rate measurements with a 2 inch x 2 inch sodium iodide coneshielded gamma detector and collection of surface and subsurface soil samples and sediment samples for thorium, radium and uranium analysis. Boreholes were installed and downhole gamma count rate data were collected.

Exposure rate data were presumably collected, but not reported. Forty-three surface soil samples were collected. Several had concentrations of radionuclides of concern which exceeded the cleanup criteria established for the site. The maximum ^{232}Th and ^{226}Ra concentrations were 238 pCi/g and 8 pCi/g, respectively. Sixteen sediment samples were collected from the Coles Brook along the southern property boundary. None of the samples contained elevated concentrations of radionuclides of concern, and Coles Brook was therefore eliminated from consideration as a means of contaminant migration.

A total of 61 boreholes were installed and gamma logged throughout the triangular-shaped property. Subsurface soil samples were collected from five of the boreholes to compare laboratory soil sample results to downhole gamma radiation measurements. As can be seen on the attached figure, the central portion of the property contains contaminated residues to estimated depths that range from approximately 4.0-9.5 feet. Some of the contamination resides beyond the Scanel property boundary to the northwest on the Hackensack-Lodi Railroad property.

I. Previous Investigations (Environmental)

Limited chemical characterization of the Scanel property was performed to determine whether hazardous waste is commingled with radioactive waste. Soil samples were collected on-site from seven boreholes by driving a split-spoon sampler in advance of the auger. Soil samples were composited to a depth of 8 ft. Samples were analyzed for volatile organic compounds, acid extractables, base/neutral extractables, PCBs, arsenic, barium, cadmium, chromium, lead, lithium, mercury, selenium, titanium, and total organic carbon. Results of the limited chemical characterization indicate the presence of priority pollutant base neutrals: phenanthrene (11.4 milligrams per kilogram (mg/kg)), chrysene (5.4 mg/kg), pyrene (7.6 mg/kg), fluoranthene (14.7 mg/kg), fluorene (1.5 mg/kg), acenaphthene, 1.2 mg/kg, and naphthalene (0.9 mg/kg).

J. Summarize Data Gaps

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geological Data - No site-specific geological data is available. Geologic data is required to quantify volumes of fill/soil for site remediation design.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - Borehole coverage on this property during the BNI investigation was fairly extensive. However, supplemental data are needed to better define the vertical extent of contamination. Since contaminated residues exist at depths greater than a few feet, borehole installation/downhole gamma spectroscopy measurements will be necessary to achieve that goal.

Environmental Data - Some chemical data exists for site soil and groundwater; however, these data are not sufficient to characterize site soils and groundwater for remedial design (including disposal) and health and safety purposes.

References

(M-111), Radiological Survey Report for the Scanel Property, Bechtel National, Inc., September 1986.

(M-714), Scanel Property Surveys, Bechtel National, Inc., September 1986.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Scanel

Property Address: 111 Essex Street

County/State: Maywood, New Jersey

Property Use:

Company Name: Scanel

Company Contact Name : Peter Scanel

Company Contact Address/Phone No.: (201) 845-0876

Current Property Use: None

Hours of Operation: None

Past Uses: Unknown

Property Description:

Lot Size: 1.5 acres

No. of Buildings : None - vacant lot

Building(s) size (each): NA

Year built: NA

Zoning: Commercial

Uses of Adjacent Properties:

North: Right-of-way to Hackensack and Lodi Railroad
East: City of Hackensack

South: Coles Brook
West: Residential properties

Nearest structure on adjacent properties and each side of site boundary:
North - Single line spur and a siding
East - Residential housing
South - Coles Brook
West - Residential housing

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ____
Equipment ID No.: ____
Installation Date: ____
Labels: ____
Fluid volume: ____

Is there any secondary containment?
Unknown

Is any of the equipment leaking or damaged? If so, describe: Unknown

Is there any known history of leaks or discharges?
Unknown

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe: Unknown

Were there past operations conducted on the property that required the use of USTs? If so, describe: Unknown

Are there any USTs removed from service, but left in the ground? Unknown

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). Unknown

Any history of leak or discharge from ASTs? Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: None

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
Unknown

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	Groundwater Investigation
Organic Compounds		x	1990 & 1991 Sampling Events
Metals		x	1990 & 1991 Sampling Events
PCBs		x	1990 & 1991 Sampling Events
Pesticides		x	1990 & 1991 Sampling Events
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	Unconsolidated Sediments: 44.48 ft above MSL
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	To the Southwest
Radiological Investigation:			
Radon Testing			Not Applicable
Exposure Rate or Surface Scan		x	PDI Investigation
Downhole Gamma Logging	x		

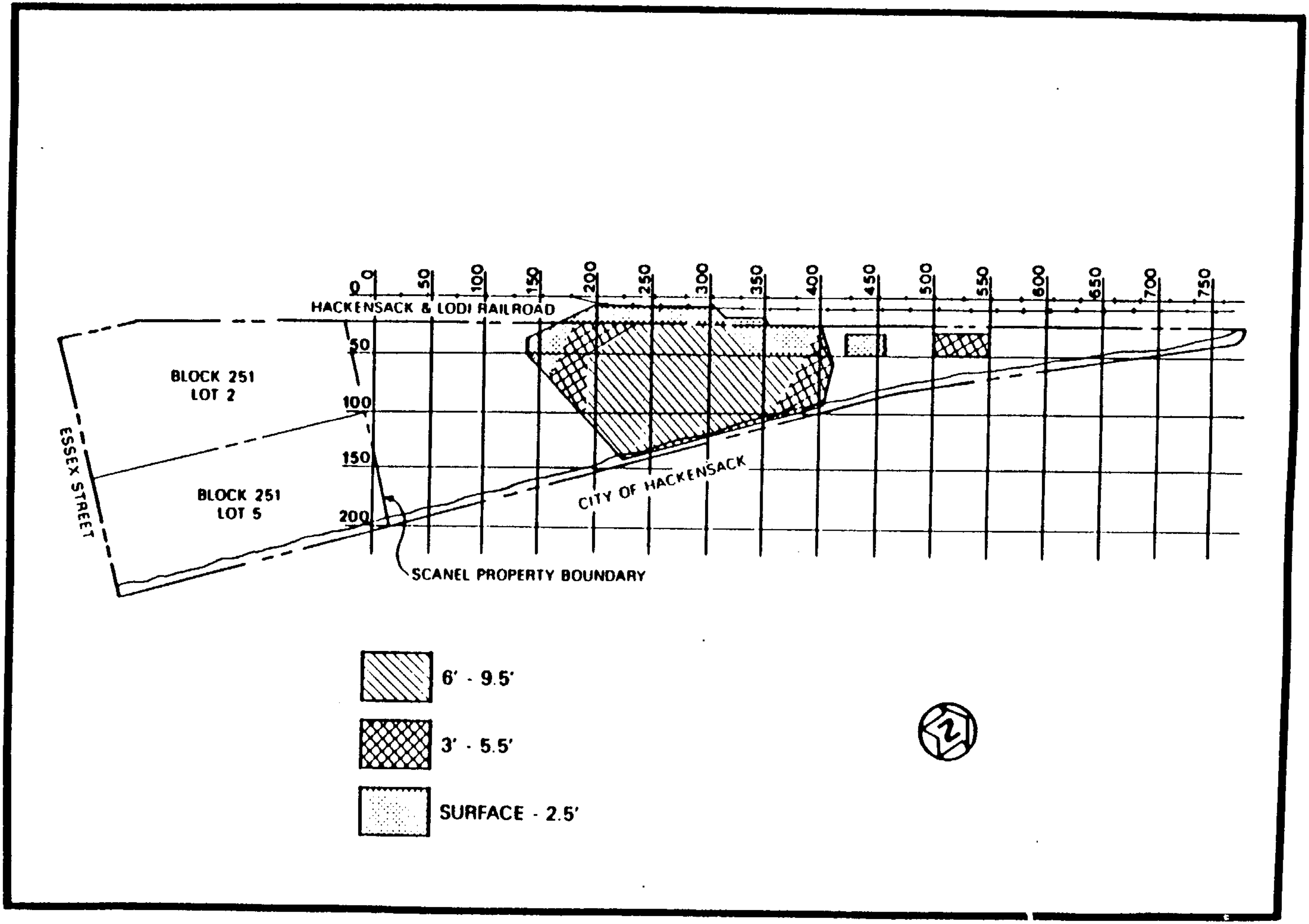

FIGURE 2 BOUNDARIES OF SURFACE AND SUBSURFACE CONTAMINATION ON SCANEL PROPERTY

Property Cluster No. 8

- 23 West Howcroft Road (DeSaussure)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

23 WEST HOWCROFT AVENUE (DeSaussure)

A. Description of Property

The DeSaussure property, located at 23 West Howcroft Road in Maywood, consists of a 52,000 square feet building, a parking lot, a wooded/grassed area, and a 0.4-acre wetland. The wetlands is classified as PFO1 (Palustrine Broadleaved Deciduous area) (M-575).

The DeSaussure company employs approximately 26 people. The building consists of a front office area and a manufacturing area at the rear of the building. Four of the employees work in the front office and the remaining 22 work in manufacturing. All employees work 6 days per week, 7:30 am – 4:00 pm. The company is engaged in the manufacture and sale of furniture products, specifically tables. The manufacturing process includes cutting, covering, gluing, painting, and machining of all components of the tables. The front portion of the building is used for clerical and sales personnel and also contains a large lunchroom area that is accessed from the manufacturing area. According to Mr. Willaim DeSaussure III, the footprint of the building was excavated to 5-6 feet. Granite-containing fill was brought in from NY. The building was expanded in 1972 with a 35-foot addition added to the west side of the building. Previous radiological characterization of the property included the drilling of boreholes through the floor of the manufacturing area. Radioactively contaminated soil is known to be present beneath a portion of the building (M-076). To the west and north lies the Sears property where Lodi Brook flows unconfined today and was most likely the source of contaminant deposition (M-575).

B. Site-Specific Geology

The natural soil in the area of the wetlands is buried under approximately 3.5 ft of bright-blue, silty fill material. The extent of the fill is limited to the PFO1 area.

Soil borings have not been been drilled at the DeSaussure property, therefore, no determination can be made as to the soil type (Maywood Soils Grouping Report, Volume 1, January 1998).

A general stratigraphic description of the area is as follows:

"The area is located within the Piedmont Physiographic Province, also known, in New Jersey, as the Newark Basin. It consists of sandstones, shales, mudstones and conglomerates covered with unconsolidated materials consisting of fill, recent deposits, glacial stratified and unstratified deposits, and soil residual" (M-575).

C. Site Specific Geophysical

Two test pits excavated on the DeSaussure property were found to contain crushed drums and drum remains. An estimated 5 drums were observed (M-575).

D. Site-Specific Geotechnical

No site-specific geotechnical information was located for this property.

E. Site-Specific Hydrogeology

The water table in the area of the wetlands is found at 8 to 12 inches below grade. Two groundwater monitoring wells exists in the northwest corner of the property (B38W12A and B38W12B), and groundwater was measured at 44.48 ft above mean sea level (msl) in unconsolidated sediments and 44.66 ft above mean sea level (MSL) (M-575). Groundwater flow is locally to the southwest.

No other site-specific hydrogeologic information was located for this property.

F. Civil/Survey Information

No site-specific Civil/Survey information was located for this property.

G. Underground Utilities

No site-specific underground utility information was located for this property.

H. Previous Investigations (Radiological)

Radiological data was presented by Bechtel National, Inc. (BNI) in the Radiological Characterization Report for the DeSaussure Property (M-076). It describes their investigation, which consisted of outdoor exposure rate measurements with a 2 inch x 2 inch sodium iodide coneshielded gamma detector and collection of surface and subsurface soil for thorium, radium and uranium analysis. Boreholes were installed and downhole gamma count rate data were collected.

Exposure rate measurements found potential surface contamination along the north and west property boundaries, adjacent to the west side and a portion of the north side of the building. An isolated area near the east property boundary and the area along the north property boundary extending westward from the east boundary to approximately 15 feet from the west boundary were also identified as potentially contaminated areas. These areas can be seen on the attached figure. Exterior exposure rates ranged from 10-146 μR/h (five measurements); interior exposure rates ranged from 8-13 μR/h (five measurements).

Six surface soils were collected along the drainage ditch in the southwestern corner of the property. Thorium-232, ^{226}Ra, and ^{238}U maximum concentrations of 124, 12.9, and 80.2 pCi/g were found, respectively. Subsurface soils collected on the property did not contain radionuclides of concern which exceeded the residential cleanup criteria. However, downhole gamma logging data collected in 24 boreholes suggested contamination to depths of up to 6 feet.

A subsurface investigation was also performed beneath the building. Boreholes were only installed to depths of two feet due to concrete pads encountered at that depth. The soil in the two feet immediately beneath the building was not contaminated, although BNI concluded that there potentially exists contaminated soil beneath the concrete pads.

BNI estimated that 35 percent of the property contains contaminated soil. The Residential Use Criteria will be applied to this property.

Document M-698 contains indoor radon and exposure rate data collected at this property. Thirteen radon samples were collected; radon concentrations ranged from 0.2-0.4 pCi/L. Two thoron samples resulted in less than 0.6 and less than 0.8 pCi/L. Interior exposure rates were in the range due to natural background. Exterior exposure rates ranged from 7.6-27.4 μR/h, with the higher readings found along the west side of the building.

I. Previous Investigations (Environmental)

Groundwater samples were collected from groundwater monitoring wells, B38W12A and B38W12B, on a quarterly basis in 1990 and 1991 (M-292). Parameters analyzed include Radiological, Metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), Pest/PCB, TOX, TOC, and rare earths. Further details or results of these analyses are unknown at present.

Soil boring samples C-37, C-27, and C-31 were sampled in 1994 (M-575). In addition, four samples (BM-1, BM-2, BM-3, and BM-4) of the blue material, located in the wooded area of the property, were collected for characterization and to evaluate if additional investigation should be undertaken in this area.

VOCs were detected in samples from BM-1 and BM-3. No VOCs were found in the blue-material samples from the BM-2 0-1 ft interval and the BM-3 1-3 ft interval. In the 0.5-1.0 ft interval for BM-1, 1,1,1-TCA was found. Seven VOCs were found in the 3-4 ft interval from BM-3. The seven VOCs found were 1,1-DCA, chlorobenzene, ethylbenzene, methylene chloride, PCE, toluene, and xylene. All of these VOCs were below the NJDEPE direct contact and impact-to-groundwater soil-cleanup criteria. VOCs were not detected in any of the soil samples from the three soil borings installed on the property (M-575).

Samples from the following borings and depth intervals contained total PAHs at concentrations exceeding 10,000 ppb: C-27 (2-4 ft), C-37 (0-2 ft) and C-37 (2-4 ft). Semivolatile PAHs were detected at concentrations above the NJDEP soil-cleanup criteria only in sample C-37 at the 0-2 ft interval. In the blue material samples, the following five semivolatile PAHs were detected: benzo(a)anthracene, benzo(b)fluoranthene, fluoranthene, phenanthrene, and pyrene. None of these were detected at concentrations exceeding the NJDEP soil-cleanup criteria. No PAHs were detected in sample BM-1 (0.5-1 ft). PAHs were detected in the 3-4 ft interval below the blue material at BM-3 (M-575).

Samples from the following borings and depth intervals contained total non-PAHs at concentrations exceeding 1,000 ppb: C-37 (0-2 ft and 2-4 ft); however none exceeded the NJDEP soil-cleanup criteria. Three semivolatile non-PAHs were detected in the blue-material samples; however none were above the NJDEP soil-cleanup criteria (M-575 & M-697).

TCL pesticide compounds were detected in the 2-4 ft samples from C-37 and C-27 at levels below the NJDEP soil-cleanup criteria. The insecticide 4,4'-DDT was detected at 710 ppb and 59 ppb, respectively. The material sampled from C-27 was described by field personnel as being soft, grayish-white and tan. The material sampled from C-37 appeared to be native soil. TCL Pests/PCBs were not detected in any of the blue-material samples on the property (M-575).

The following metals were detected in all soil and blue-material samples on the property: aluminum, arsenic, barium, calcium, lead, magnesium, iron, manganese, and zinc. The metals detected at concentrations exceeding the NJDEP residential direct and contact soil-cleanup criteria were arsenic, barium, beryllium, cadmium, lead, chromium, and antimony. A sample of the blue material was sent for X-ray diffraction analysis to identify its composition. The sample was collected from the 0.5-2 ft in BM-4. Results indicate that the material is composed of hydrous calcium sulfate or as it is commonly known, gypsum. Metals results from the other blue-material samples (from BM-1, BM-2, and BM-3) showed elevated concentrations of calcium (286,000 ppm) (M-575).

Drum remains were found in two test pits excavated on-site. A total of 5 drums were observed (M-575).

J. Summarize Data Gaps

Historical Data - Information is lacking or uncertain for current property ownership, past uses, and site conditions.

Geological Data - No site-specific geological data is available. Geologic data is required to quantify volumes of fill/soil for site remediation design.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures/buried drums that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - Some site-specific hydrogeological data is available; however, it does not constitute a site-wide hydrogeological characterization. It may be necessary to obtain additional hydrogeological data in order to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow. Details of additional hydrogeological work will be outlined in the Groundwater Investigation Work Plan.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - Some chemical data exists for site soil and groundwater; however, this data is not sufficient to characterize site soils and groundwater for remedial design (including disposal) and health and safety purposes.

References

M-076, Radiological Characterization Report for the DeSaussure Property, Bechtel National, September, 1989.

M-292, Transmittal of Groundwater Analytical Results Oak Ridge Operations, Department of Energy (Administrative Record, Maywood, New Jersey), November 1993.

M-575, Maywood Chemical Company Site, Final Remediation Investigation Report, CH2M Hill, November 1994.

M-697, Maywood Remedial Investigation Data Inventory for Groundwater, Surface Water, and Sediment (Administrative Record), United States Army Corps of Engineers, 1994

M-698, Results of Radon and Gamma-Radiation Measurements at 19 Commercial and Government Properties of the Maywood Site, Bechtel National, August, 1994.

Maywood Soils Grouping Report, Volume I, Maywood, New Jersey, USACE, January, 1998.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: DeSaussure Property

Property Address: 23 West Howcroft Avenue

County/State: Maywood, New Jersey

Property Use:

Company Name: DeSaussure

Company Contact Name : William DeSaussure IV

Company Contact Address/Phone No.:
Unknown

Current Property Use: Manufacture and sale of furniture products (tables)

Hours of Operation: 6 days per week, 7:30 am-4:00 pm

Past Uses: Mr. DeSaussure III stated that he bought the land from the chemical company.

Property Description:

Lot Size: 105,000 ft^2 approximately

No. of Buildings : One building

Building(s) size (each): 52,000 ft^2

Year built: Constructed in 1961

Zoning: Commercial

Uses of Adjacent Properties:

Uses of Adjacent Properties:

North:	205 Maywood Avenue, Myron Manufacturing
East:	Maywood Avenue, Residential properties
South:	85-99 Route 17 North, Hunter Douglas, SWS Realty
West:	Sears, 149-151 Maywood Avenue

Nearest structure on adjacent properties and each side of site boundary:
North - Myron Manufacturing Building
East - Residential housing east of Maywood Avenue
South - 95,000 ft2 building on Hunter Douglas property
West - 6-acre warehouse on Sears property

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: __________
Equipment ID No.: __________
Installation Date: __________
Labels: __________
Fluid volume: __________

Is there any secondary containment?
Unknown

Is any of the equipment leaking or damaged? If so, describe: Unknown

Is there any known history of leaks or discharges?
Unknown

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe: Unknown

Were there past operations conducted on the property that required the use of USTs? If so, describe: Unknown

Are there any USTs removed from service, but left in the ground? Unknown

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). Unknown

Any history of leak or discharge from ASTs? Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: Unknown

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal - there are two on-site groundwater monitoring wells: B38W12A and B38W12B, located in the northwest corner of the property. Groundwater flow, locally, is to the southwest.

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
Yes, data from 1990 and 1991 exists, but analytical results are unknown.

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	PDI Investigation
Organic Compounds	x		1990 & 1991 Sampling Events
Metals	x		1990 & 1991 Sampling Events
PCBs	x		1990 & 1991 Sampling Events
Pesticides	x		1990 & 1991 Sampling Events
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		Unconsolidated Sediments: 44.48 ft above MSL
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow	x		To the Southwest
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan		x	PDI Investigation
Downhole Gamma Logging		x	PDI Investigation

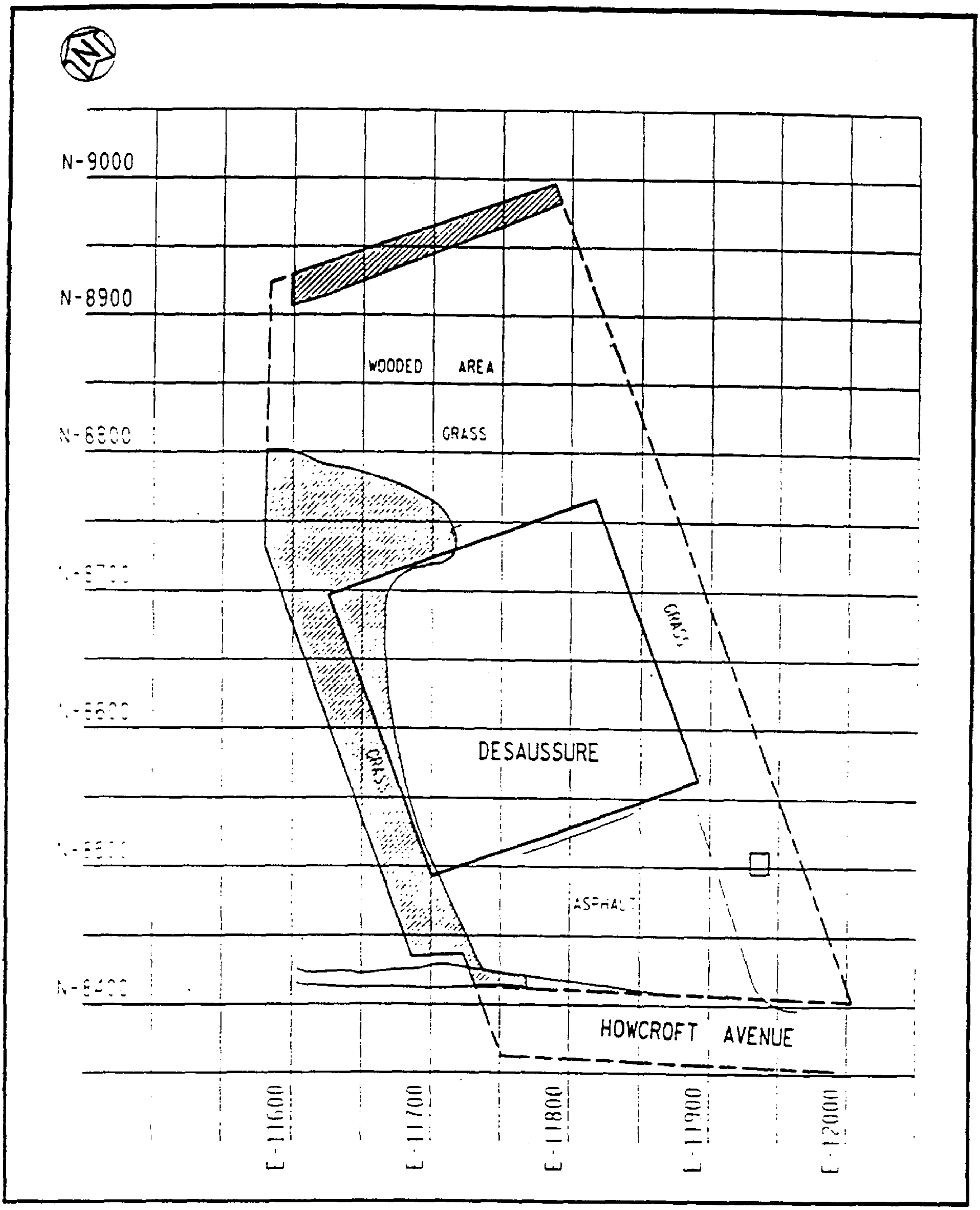

FIGURE 5-2 AREAS OF SUBSURFACE CONTAMINATION AT DESAUSSURE

Property Cluster No. 9

- 149-151 Maywood Avenue (Sears)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

SEARS DISTRIBUTION CENTER (149-151 Maywood Ave.)

A. Description of Property

The Sears Distribution Center (hereafter referred to as the Sears property), located at 149-151 Maywood Ave., comprises approximately 27.4 acres. The site lies in a highly developed area in the Borough of Maywood and the Township of Rochelle Park, in Bergen County, New Jersey. The Sears property is bounded New Jersey Route 17 on the west; by Gulf and Sunoco Service Stations on the south; by the DeSaussure property and Maywood Avenue on the east; and by the MISS and the Stepan Company on the north.

Much of the fenced Sears property is covered by a 6.5-acre warehouse. Approximately 11 acres of the site are paved, and the remaining areas are vegetated. A 3-acre wetland is located on the east side of the warehouse. The low-lying area between the Sears and Stepan properties along the rail spur also is classified as a wetland.

The Sears facility is active 7 days a week and 24 hours a day and there are no slow periods in their operations. Only three annual holidays are observed. Sears uses 100 % of the dock space but only about 1/3 of the warehouse floor space. Approximately 50 delivery trucks leave by 9:00 am every morning. Dock space is relatively inactive between 9:00 am and 3:00 pm. The southeast corner of the facility is also used as a pickup point for customers who do not want delivery. The western side of the facility is also used as a staging area for Sears trucking contractors. The eastern side of the facility is a distribution facility for outlet stores in the area. The land area along the southern property border fence was leased to a landscape contractor. The loading dock has a concrete pad while the parking lot appears to be only asphalt. Sears is in the process of closing out a diesel and gasoline UST site located southeast of the building.

B. Site-Specific Geology

The Maywood Site is located in northeastern New Jersey within the glaciated section of the Piedmont Plateau. The topography is generally level, with minor relief. Elevations range from 45 to 75 feet. Site-specific geologic information was collected by CH2M Hill in 1993 (document M-575). This information is summarized in the following paragraphs.

The sediments underlying the Sears property are divided into two stratigraphic units: a bedrock unit composed of interbedded, well-cemented sandstone, and siltstone of Triassic/Jurassic age (Passaic Formation), and an overlying section of unconsolidated clastic materials of Pliocene-Pleistocene age. These units are separated by an erosional unconformity. The surface of the bedrock unit was extensively eroded by both glacial and fluvial processes, and the unconsolidated sediments overlying the bedrock surface are composed of clastic materials deposited by these processes.

Boring logs for the Sears site were not available at the time of this review. In addition, the review copy of the text of the CH2M Hill RI (document M-575) is missing pages relevant to the discussion of site-specific geology for the Sears Site.

C. Site Specific Geophysical

CH2M Hill conducted borehole geophysical surveys in several bedrock boreholes in May, 1992 as part of the RI activities for the Stepan and vicinity properties (document M-575). Geophysical logs conducted during each borehole survey included natural gamma ray, spontaneous potential (SP), long normal (64-inch) and short normal (16-inch) resistivity (LSN), fluid resistivity, temperature, and three-arm caliper.

The objectives of the geophysical surveys were to correlate geophysical log signatures to the lithologic data obtained from several bedrock cores, and to locate water-bearing fractures. The data were then used in conjunction with data obtained from hydraulic pressure injection (packer) testing to select screened intervals.

As part of the RI conducted by CH2M Hill for the Stepan and vicinity properties (including the Sears property), a surface geophysical investigation was performed from September 3, 1991 through March 17, 1992 (document M-575). The purpose of the survey was to identify potential chemical contamination sources. Specifically, the geophysical investigation was performed in an effort to locate and define ferromagnetic containers in the overburden soils. A magnetic survey was conducted; data was systematically collected at 10-foot intervals along north-south grid lines. The wetland area south of the building was surveyed at 20-foot intervals because the area was impassible without considerable brushing. In some locations, no data could be collected because perched water and marsh deposits were too deep. A total of 183 areas of buried metal have been identified at the site. These areas, based on magnetic anomalies, are not a result of known sources. The results and interpretation of the magnetic survey were used as a basis for a test pit program. The test pit program was conducted from March 26, 1992, through May 21, 1992. A total of 129 test pits were excavated on the Stepan property and 6 vicinity properties. Fourteen test pits on the Sears property were found to contain crushed drums or drum remains with no contents. An additional 16 test pits on Sears were identified as containing drums with contents. Approximately 50 drums were observed in test pits at Sears.

D. Site-Specific Geotechnical

Laboratory geotechnical parameters were collected from one soil boring from the Sears property (boring C24, 4-6 foot interval). Laboratory soil testing parameters included Atterberg limits (liquid and plastic), grain size distribution (wash sieve and hydrometer), and moisture content. In addition, total organic carbon (TOC) was measured for this sample.

E. Site-Specific Hydrogeology

Site-specific hydrogeologic information was collected by CH2M Hill in 1993 (document M-575). This information is summarized in the following paragraphs.

Both the bedrock and the overlying unconsolidated material (overburden) are sources of groundwater for the Maywood area. The shallow groundwater flow system at the Sears property is in the unconsolidated sediments and the shallow Passaic Formation bedrock and occurs under unconfined, water table, and partially confined conditions. Groundwater in the overburden layer generally flows to the south and west. General flow directions in the bedrock are similar to the water table aquifer (i.e., groundwater flows south and west).

Water levels for the Stepan and vicinity sites (including the Sears property) were found to decrease from June 1, 1992, to November 5, 1992, in both the overburden and bedrock wells. Fluctuations in water levels in the overburden wells varied from 0.2 feet to 3.94 feet. The fluctuations in the water levels in the bedrock wells at the same locations varied from 0.54 feet to 6.07 feet.

Pressure injection testing and slug tests were performed for overburden and bedrock wells to estimate hydraulic conductivity and transmissivity in the zones tested. A conceptual hydrogeological model of the study was developed and is discussed in the CH2M Hill RI (document M-595).

F. Civil/Survey Information

As part of the RI conducted by CH2M Hill for the Stepan and vicinity properties, surveying work was performed by GEOD Corporation of Newfoundland, New Jersey. Surveying activities included establishing horizontal and vertical control networks at the site, including permanent benchmarks, and locating existing topographic features (such as building corners, fence lines, etc.) in New Jersey State Plane Coordinates. Sampling locations including surface water and sediment sample points, soil borings and monitoring wells were located horizontally and vertically. Also, eight distinct wetland areas were located horizontally. A reconnaissance of the entire site was conducted. Locating the extent of soil types and changes in plant community was difficult owing to minimal topographic relief, presence of disturbed soil, and lack of native vegetation. The majority of the wetlands identified in the study area are Palustrine Emergent (PEM), mowed PEM, and Palustrine Broad-leaved Deciduous (PFO1). Areas along the south property border, adjacent to Cluster No. 6 properties, and areas along Route 17 were identified as PEM. East of the building and fenceline, on either side of the roadway leading to Maywood Avenue, the wetlands are identified as PFO1. The hydrologic regime for the site is primarily influenced by run-off and a relatively high water table. The ditches in the area appear to have been put in place for offsite and onsite drainage control. The NJDEP requires transition area around all wetland boundaries, the width of the transition area varies depending upon the type of classification assigned to the wetland by NJDEP. Because there were no threatened plant or animal species identified in the area the wetlands will not be classified as exceptional resource value wetlands. However, the wetlands within the site boundaries may be classified as freshwater wetlands of intermediate or ordinary resource value, and therefore, would have at least a 50-foot transition area assigned to them (document M-575).

G. Underground Utilities

No maps showing underground utilities were located.

H. Previous Investigations (Radiological)

Radiological characterization of the Sears Property conducted during the mid/late 1980s consisted of exposure rate measurements with a PIC, dose rate measurements (beta/gamma detector), collection of surface and subsurface soil, and sediment samples for thorium, radium, and uranium analyses. Surface water samples were collected for gross alpha particle concentration analysis. Boreholes were installed and downhole gamma count rate data were collected. In addition to outdoor boreholes, three boreholes were installed through the warehouse floor.

Surface exposure rates were elevated over a 940,000 square foot area. The attached figure shows the majority of the property affected with both surface and subsurface contamination; a few smaller areas had subsurface contamination only.

Subsurface soil samples were collected from six boreholes. Thorium-232 was the radionuclide of concern present at the highest concentrations. Thorium-232, ^{226}Ra, and ^{238}U maximum concentrations were 180, 37, and less than 232 pCi/g. Surface soil and sediment samples also had elevated concentrations of these radionuclides; Maximum thorium concentrations in surface soil and sediment were 70 and 93 pCi/g, respectively. The majority of the contaminated material appears to reside within three feet of the ground surface. However, at some locations, gamma data indicated contamination to depths of 5 to 9 feet. In the scope of work prepared for the field demonstration project, the ACE estimated 33,910 cubic yards of contaminated material on the property.

Two surface water samples contained 15.8 and 18.4 pCi/L gross alpha concentration. Contamination extended beneath the warehouse, although interior exposure rates did not exceed 15 μR/h.

I. Previous Investigations (Environmental)

Source: Characterization Report for the Sears Property, BNI, 05/98 (M-118)

Soil samples were collected from 10 boreholes. Since the purpose the investigation was to perform a limited chemical characterization, samples were composited to a maximum drill hole depth of 16 feet. Samples were analyzed for VOCs, SVOCs, priority pollutant metals, pesticides, PCBs, mercury, and

RCRA hazardous waste characteristic parameters (i.e., EP toxicity, corrosivity, reactivity, and ignitability). Holding time protocols for all of the VOA were exceeded by the laboratory, therefore the analysis results can only be used to provide a general evaluation of site conditions.

Source: Maywood Chemical Company Site Remediation Investigation Report, CH2M Hill, 11/94 (M-575)

- Twenty soil borings were advanced on the Sears property in April, 1992 as part of a soil overburden investigation. Soil samples were homogenized from pre-selected depth-specific intervals. Soil samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TAL metals and cyanide, and lithium. Samples from three borings at Sears (C-14, C-9, and C-23) contained PAHs at concentrations exceeding 10,000 ppb. The most frequently detected PAHs were benzo(b)fluoarnthene, benzo(k)fluoarnthene, benzo(a)pyrene, benzo(a)anthracene, benzo(g,h,I)perylene, fluoranthene, indeno(1,2,3-cd)pyrene; phenanthrene, chrysene, and pyrene. Samples from nine borings at Sears (C-1, C-16, C-17, C-18, C-19, C-24, C-20, C-9, and C-29) contained total non-PAHs at concentrations exceeding 1,000 ppb. Non-PAHs detected at Sears include 2,4-dimethylphenol, 2-methylphenol, benzy butyl phthalate, di-n-octyl-phthalate, and n-nitrosodiphenylamine, phenol. In addition, caffeine was detected at 9 boring locations (maximum concentration of 2100J), and d-limonene was detected at one sampling location (concentration of 590J). Nine samples from the Sears property exceeded the NJDEP arsenic soil-cleanup criterion of 20 ppm (maximum concentration was 105 ppm). Three samples exceeded the NJDEP cadmium soil-cleanup criterion of 1 ppm (maximum concentration was 2.4 ppm). Two samples exceeded the NJDEP chromium cleanup criterion (maximum concentration of 290J ppm). Fifteen samples exceeded the NJDEP lead soil-cleanup criterion of 100 ppm (maximum concentration of 883 ppm). Several samples exceed the NJDEP beryllium cleanup criterion of 1 ppm (maximum concentration of 1.8 ppm). Lithium was detected in all soil samples from the Sears property. The maximum concentration was 810 ppm from boring C-16.

- Two rounds of groundwater sampling were conducted: the first round was conducted July 20 to August 4, 1992, and the second round was conducted July 17 through August 3, 1993. Fifteen wells on the Sears property were sampled during each round. Groundwater samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TOC, TAL metals and cyanide, and lithium.

- Four surface water and four sediment samples were collected from locations on the Sears property. The surface water samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TAL metals and cyanide, and lithium. The sediment samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TOC, TAL metals and cyanide, and lithium.

- Samples were collected from twelve test pits on the Sears property. Test-pit samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TAL metals and cyanide, and TCLP VOCs, SVOCs, herbicides, pesticides and metals. A cluster of test pits located in the asphalt/grassy area alongside a culvert on Sears, contained very high total concentrations of VOCs.

J. Summarize Data Gaps

Pilot Study Data Gaps:

Historical - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Available data is sufficient to geologically characterize site soils for purposes of fill/soil acquisition for the pilot study.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to characterize underground utilities/structures that may impact intrusive activities. Details regarding geophysical activities will be included in the Buried Drum program to be developed for the Sears Property.

Geotechnical Data - Geotechnical data gaps for the pilot study for this site include laboratory data needed for design of the soil washing system. One soil sample from the Sears site was analyzed for grain size distribution (by sieve and hydrometer analyses), Atterberg limits and moisture content. Testing of additional samples, however, will be required to plan and design the pilot study.

Hydrogeological Data - Available data is sufficient to characterize the site hydrogeologically for purposes of soil acquisition for the pilot study.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available

Radiological Data - Existing data are sufficient to identify areas with significant volumes of soil containing radionuclides of concern which exceed the cleanup level.

Environmental Data - It may be necessary to obtain additional data to characterize site soils and groundwater for pilot study (including disposal) and health and safety purposes.

Design Data Gaps:

Historical - See Pilot Study Data Gaps.

Geologic Data - It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Geophysical Data - See Pilot Study Data Gaps.

Geotechnical Data - Borings were made in over one hundred locations across this site, generally ranging between 5.5 feet and 12.5 feet deep below ground surface. Proposed excavation depths have not been clearly defined. It is likely that additional subsurface information will be needed for soils and bedrock, particularly at depths below the existing subsurface data. This information will be needed to design excavation support systems if deep excavations will be conducted adjacent to the rail spurs traversing the site (if they require salvage), New Jersey State Route 17, the Sears building, the off-site buildings and structures near the Sears property line, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement. Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - Available data is sufficient to characterize the site hydrogeologically for purposes of remediation design.

Civil/Survey Data - See Pilot Study Data Gaps.

Underground Utility Data - See Pilot Study Data Gaps.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design.

Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - It may be necessary to obtain additional data to characterize site soils and groundwater for remediation design (including disposal issues) and health and safety purposes.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Sears Distribution Center

Property Address: 149-151 Maywood Ave.

County/State: Bergen County, New Jersey

Property Use:

Company Name: KIN Properties, Inc., Sears Distribution Center

Company Contact Name : Patricia D'Ambrisi (Sears Logistics), Scoth DeMuth (Sears Environmental Affairs, Howard E. Heller (KIN Properties)

Company Contact Address/Phone No.: (201) 291-400, (847) 286-5530, (914) 683-8080, x 121

Current Property Use: Sears Distribution Center – Home, Store Delivery, Customer Pickup Area,

Hours of Operation: 7 days a week, 24 hours a day

Past Uses: Unknown

Property Description:

Lot Size: 27.4 acres

No. of Buildings : One

Building(s) size (each): Approx. 6.5 acre warehouse

Year built: Unknown

Zoning: Industrial/Commercial

Uses of Adjacent Properties:

North: MISS and Stepan Chemical Company
East: DeSaussure property & Maywood Avenue
South: Gulf and Sunoco service stations
West: New Jersey Route 17

Nearest structure on adjacent properties and each side of site boundary:
Nearest structures are Stepan Company buildings to the north.

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ____
Equipment ID No.: ____
Installation Date: ____
Labels: ____
Fluid volume: ____

Is there any secondary containment?

Is any of the equipment leaking or damaged? If so, describe:

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property?

	Tank 1	Tank 2	Tank 3
Tank capacity:	15,000	10,000	10,000
Substance Stored:	Fuel Oil	Gasoline	Diesel
Installation Date:	Unknown	Unknown	Unknown
Registration (Y/N)	Unknown	Unknown	Unknown
Corrosion protection	Unknown	Unknown	Unknown
Single or double-walled	Unknown	Unknown	Unknown
Leak detection tests (Y/N)	Unknown	Unknown	Unknown
Results of testing:			

All tank information comes from the Stepan RI performed by CH2M Hill (document M-575). The 15,000 gallon fuel oil tank remains active. The two 10,000 gallon tanks are inactive.

Any known history of leaks ? ______________________________

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? ______________________________

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:

Were there past operations conducted on the property that required the use of USTs? If so, describe: ______________________________

Are there any USTs removed from service, but left in the ground?

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).

Any history of leak or discharge from ASTs?

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown.

Describe condition of containers (is there any corrosion or leakage?)

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Hazardous Waste Storage and Disposal

EPA Identification number for site: Unknown

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
No on-site wells for water supply

Note if site falls within floodplain, describe direction of runoff.
Site does not fall in 100-year or 500-year flood hazard area.

Note if any water quality data is available for on-site wells.
There is monitoring well data available for on-site wells.

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	Potentially from CH2M Hill
Survey drawing including topography		x	Potentially from CH2M Hill
Aerial photographs (historical)		x	Potentially from CH2M Hill
Utility Layouts:			
Water		x	Local utility company
Sewer Lines		x	Local utility company
Gas Lines		x	Local utility company
Electric Lines		x	Local utility company
Telephone Lines		x	Local utility company
Cable Lines		x	Local utility company
Above-ground Storage Tanks		x	Local utility company
Underground Storage Tanks		x	Local utility company
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		X	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds	x		
Metals	x		
PCBs	x		
Pesticides	x		
Sampling for Constituents of Concern in Groundwater:			
Radionuclides	x		
Organic Compounds	x		
Metals	x		
PCBs	x		
Pesticides	x		
Geophysical Investigations			
GPR Surveys		x	
Magnetometer Surveys		x	Potentially from CH2M Hill

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Hydrometer Analysis		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		PDI Investigation
Water table fluctuations	x		PDI Investigation
Direction of groundwater flow	x		PDI Investigation
Radiological Investigation:			
Radon Testing		x	
Exposure Rate or Surface Scan	x		PDI Investigation
Downhole Gamma Logging	x		PDI Investigation

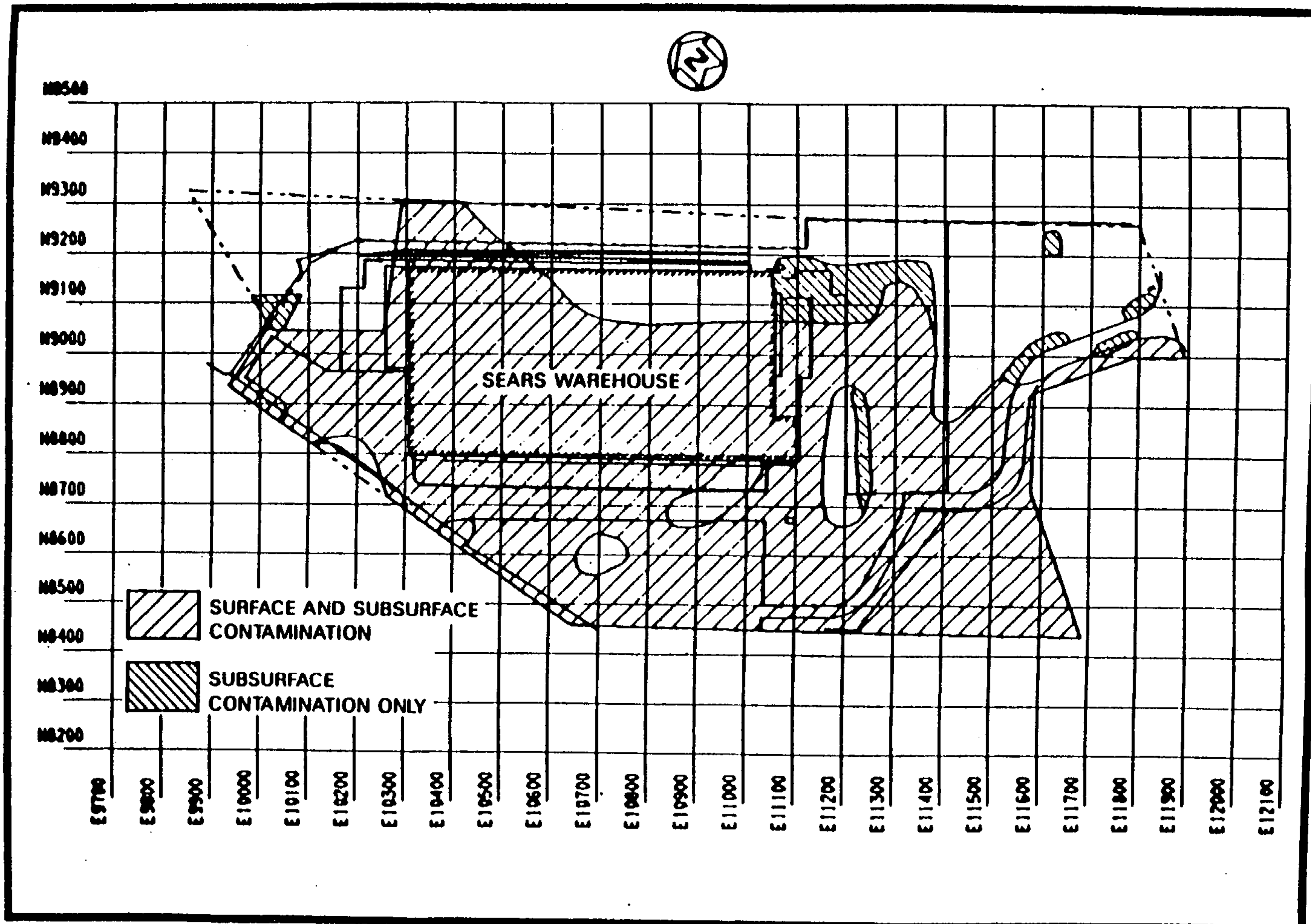

FIGURE 5-1 AREAS OF CONTAMINATION AT THE SEARS PROPERTY

Property Cluster No. 10

- 100 West Hunter Avenue (Stepan Company)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

STEPAN CHEMICAL COMPANY

A. Description of Property

The Stepan Chemical Company, located at 100 W. Hunter Ave., comprises approximately 18 acres. The site is located mainly in the Borough of Maywood, except for a small area in the southwest corner, which is in the Township of Rochelle Park. The DOE-owned MISS property borders the Stepan property to the west. To the north, and northeast, the property is bordered by a New York, Susquehanna, and Western Railroad line and several residential properties. To the east, there are several businesses which line West Hunter Avenue, and to the south the property is bordered by a Sears distribution center. Stepan's chemical processes include various extractions for natural flavorings used in soft drink products, as well as the manufacture of fatty acid esters for the cosmetic, personal care, and food industries. Stepan employs approximately 80 to 100 employees.

Approximately 50 percent of the Stepan property is covered with structures or with the foundations of former structures, aboveground tank farms, and asphalt paving. The site consists of a series of man-made terraces on which the operating facility was constructed. The difference in elevation between the highest terrace (at the north side of the property) and the lowest terrace (at the south side) is approximately 25 feet. The property, excluding the main office and parking area, is enclosed by a chain-link fence.

Three low-level radiological burial sites are located on the property: Burial pit 1 (approximately 100 feet by 50 feet) is under the parking lot north of West Hunter Ave.; Burial pit 2 (approximately 200 feet by 100 feet) is located along the east-central portion of the Stepan property adjacent to the office building on West Hunter Ave.; and Burial pit 3 is under a large warehouse in the south-east corner of the Stepan property (the area extent of this burial pit was not accurately determined since it is located beneath a building). Contamination in burial pits 1 and 2 has been found at depths ranging from 0.5 to 15.5 feet. A railroad spur transects an undeveloped open area adjacent to the MISS, and continues across MISS.

B. Site-Specific Geology

The Maywood Site is located in northeastern New Jersey within the glaciated section of the Piedmont Plateau. The terrain is generally level, with minor relief. Elevations range from 45 to 75 feet. Site-specific geologic information was collected by BNI in 1991 (document M-209), and by CH2M Hill in 1993 (document M-575). This information is summarized in the following paragraphs.

The sediments underlying the Stepan property are divided into two stratigraphic units: a bedrock unit composed of interbedded, well-cemented sandstone, and siltstone of Triassic/Jurassic age (Passaic Formation), and an overlying section of unconsolidated clastic materials of Pliocene-Pleistocene age. These units are separated by an erosional unconformity. The surface of the bedrock unit was extensively eroded by both glacial and fluvial processes, and the unconsolidated sediments overlying the bedrock surface are composed of clastic materials deposited by these processes.

There is a bedrock high along the north-central area of the Stepan property (under the parking lot) along the New York, Susquehanna, and Western Railroad. In this region, bedrock is within 6 inches of the surface. This bedrock high extends to the east and southeast across the Myron property along Maywood Avenue. Two prominent highs extend south and west-southwest from this high point in the Stepan parking lot. The southwesterly oriented ridge connects across a saddle to the pronounced topographic ridge west of Lodi Brook. This saddle in the bedrock relief is expressed in the present surface topography and corresponds to a surface water divide.

In the lower portions of geologic borings drilled in the bedrock lows, sands and gravels derived from bedrock were encountered immediately above the weathered surface. The gravels were commonly composed of rounded to subrounded pebbles of Passaic Formation sandstone, indicating local fluvial transport and reworking. Gravel-sized fragments of igneous and metamorphic materials and boulder-sized erratics of sedimentary materials were observed in these deposits, indicating glacial transport into the local area.

Fill materials were encountered in many borings on the Stepan property, particularly at the waste burial sites. Fill materials varied from clays to coarse sands containing brick fragments, black and white mottled clay, concrete chips, wood chips, and other miscellaneous materials.

C. Site Specific Geophysical

CH2M Hill conducted borehole geophysical surveys in several bedrock boreholes in May, 1992 as part of the RI activities for the Stepan and vicinity properties (see document M-575). Geophysical logs conducted during each borehole survey included natural gamma ray, spontaneous potential (SP), long normal (64-inch) and short normal (16-inch) resistivity (LSN), fluid resistivity, temperature, and three-arm caliper. The objectives of the geophysical surveys were to correlate geophysical log signatures to the lithologic data obtained from several bedrock cores, and to locate water-bearing fractures. The data were then used in conjunction with data obtained from hydraulic pressure injection (packer) testing to select screened intervals.

As part of the RI conducted by CH2M Hill for the Stepan and vicinity properties, a surface geophysical investigation was performed from September 3, 1991 through March 17, 1992. The purpose of the survey was to identify potential chemical contamination sources. Specifically, the geophysical investigation was performed in an effort to locate and define ferromagnetic containers in the overburden soils. A magnetic survey was conducted; the results and interpretation of the magnetic survey were used as a basis for a test pitting program. The test-pit program was conducted from March 26, 1992, through May 21, 1992. A total of 129 test pits were excavated on the Stepan property and 6 vicinity properties. Three of the test pits on the Stepan property each contained one drum with no contents.

There are eight existing and former underground storage tank (UST) locations on the Stepan property. The Stepan RI (M-575) details the approximate locations, status, and contents of the existing and former tanks. In addition, soil and groundwater data from samples collected adjacent to 2 USTs on the Stepan property are provided in the Appendices to the RI.

D. Site-Specific Geotechnical

No geotechnical laboratory data was located.

E. Site-Specific Hydrogeology

Site-specific hydrogeologic information was collected by BNI in 1991 (document M-209), and by CH2M Hill in 1993 (document M-575). This information is summarized in the following paragraphs.

Both the bedrock and the overlying unconsolidated material (overburden) are sources of groundwater for the Maywood area. The shallow groundwater flow system at the Stepan property is in the unconsolidated sediments and the shallow Passaic Formation bedrock and occurs under unconfined, water table, and partially confined conditions. Water level elevations ranged from approximately 49 to 57 feet above MSL. Groundwater in the overburden layer generally flows to the south and west.

The potentiometric level of the semi-confined bedrock groundwater system ranged from 45 to 56 feet above MSL. General flow directions in the bedrock are similar to the water table aquifer (i.e., groundwater flows south and west).

Water levels were found to decrease from June 1, 1992, to November 5, 1992, in both the overburden and bedrock wells. Fluctuations in water levels in the overburden wells varied from 0.2 feet to 3.94 feet. The fluctuations in the water levels in the bedrock wells at the same locations varied from 0.54 feet to 6.07 feet.

Pressure injection testing and slug tests were performed for overburden and bedrock wells to estimate hydraulic conductivity and transmissivity in the zones tested. A conceptual hydrogeological model of the study was developed and is discussed in the CH2M Hill RI (document M-595).

F. Civil/Survey Information

As part of the RI conducted by CH2M Hill for the Stepan and vicinity properties, surveying work was performed by GEOD Corporation of Newfoundland, New Jersey. Surveying activities included establishing horizontal and vertical control networks at the site, including permanent benchmarks, and locating existing topographic features (such as building corners, fence lines, etc.) in New Jersey State Plane Coordinates. Sampling locations including surface water and sediment sample points, soil borings and monitoring wells were located horizontally and vertically. Also, eight distinct wetland areas were located horizontally. The basemap which resulted from these survey activities is available in the CH2M Hill RI. In addition, the wetlands delineation is detailed in the Appendices to the CH2M Hill RI (document M-575).

G. Underground Utilities

No maps showing underground utilities were located.

H. Previous Investigations (Radiological)

The 1992 Remedial Investigation Report for the Maywood Site (Bechtel National, Inc., DOE Contract No. DE-AC05-91OR21949) consisted of indoor and outdoor exposure rate measurements with 2" x 2" sodium iodide unshielded/coneshielded gamma detectors and a PIC and collection of surface and subsurface soil for thorium, radium and uranium analysis. Boreholes were installed and downhole gamma count rate data were collected.

Outdoor surface exposure rates were elevated (> 20 μR/h) in 27 of the 91 locations where measurements were performed, with a maximum of 228 μR/h. Surface soil samples were collected from 238 locations; contamination was detected in approximately 165 samples, with maximum ^{232}Th, ^{226}Ra, and ^{238}U concentrations of 380 pCi/g, 130 pCi/g, and < 50 pCi/g, respectively.

A total of 237 boreholes were installed; subsurface soil samples were collected and downhole gamma logging was performed in each borehole. Contamination was evident in approximately 105 boreholes. Maximum ^{232}Th, ^{226}Ra, and ^{238}U subsurface soil concentrations were 1,592 pCi/g, 333 pCi/g, and 170 pCi/g, respectively; with the highest ^{232}Th concentration found in burial pit 1. Contamination in burial pits 1 and 2 was found at depths ranging from 0.5 to 15.5 feet.

Contaminated areas, including the three burial pits, are shown on the attached figures. The RI confirmed that the primary sources of radioactive contamination are burial pits 1 (maximum depth of radioactive contamination 13.5 feet, with an areal extent of approximately 100 by 50 feet), 2 (maximum depth of radioactive contamination 15.5 feet, with an areal extent of approximately 200 by 100 feet), and 3 (which consists of five trenches ranging up to 15 feet in depth). Burial pit contents include tailings and slurry pile material excavated from the Ballod Property. Radioactive contamination also is present in former thorium processing areas and where process residues were used as fill material in low lying areas.

Secondary areas of contamination are located in the northwestern corner of the property and along the southern property line, adjacent to the Sears Distribution Center property. The three most significant areas are in the south-central portion of the property.

In the scope of work prepared for the field demonstration project, the ACE estimated 45,082 cubic yards of contaminated material on the property.

I. Previous Investigations (Environmental)

Source: Maywood Remedial Investigation, BNI, 12/92 (M-209)

Thirty-nine samples were collected from ten boreholes on the Stepan property for chemical analysis. All 39 samples were analyzed for metals and rare earth elements. Twelve samples from four of the boreholes were analyzed for VOCs, 11 soil samples from 5 boreholes were analyzed for SVOCs, and 31 samples collected from eight boreholes were analyzed for TPH. In addition, TCLP tests were analyzed for metals (36 samples), VOCs (36 samples), SVOCs (36 samples), pesticides (27 samples), and herbicides (28 samples).

Source: Maywood Chemical Company Site Remediation Investigation Report, CH2M Hill, 11/94 (M-575)

- Ten soil borings were advanced on the Stepan property in February 1992 as part of a soil overburden investigation. Soil samples were homogenized from pre-selected depth-specific intervals. Soil samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TAL metals and cyanide, and lithium. Of the TCL VOCs, benzene and xylene were detected at levels above the NJDEP soil cleanup criteria. PAHs at levels exceeding the NJDEP soil cleanup criteria were present at the 0-2.0 foot depth interval only. Caffeine was found at one location on Stepan. D-limonene, a-pinene, pesticides and PCBs were not detected in soil samples collected on Stepan. Arsenic, barium, cadmium, lead, selenium, and antimony were all found in soil samples at levels exceeding the NJDEP soil cleanup criteria.

- Samples were collected from four test pits on the Stepan property. Test pit samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TAL metals and cyanide, and TCLP VOCs, SVOCs, herbicides, pesticides and metals. Acetone, benzene, toluene, and xylene were detected at low concentrations. Semivolatile PAHs were detected in TP-25, located in the northwest corner of the property. The sample was collected from soils associated with a crushed drum, at a depth of 0.6 foot. Non-PAHs were detected at low concentrations.

- Two rounds of groundwater sampling were conducted: the first round was conducted July 20 to August 4, 1992, and the second round was conducted July 17 through August 3, 1993. Twenty-three wells on the Stepan property were sampled during each round. Groundwater samples were analyzed for TCL VOCs, TCL SVOCs, caffeine, a-pinene, d-limonene, TCL pesticides/PCBs, TOC, TAL metals and cyanide, and lithium.

- A soil gas survey was performed at Stepan from July 26 to August 6, 1993. This investigation was conducted within areas designated by CH2M Hill as the Central Tank Farm Area and the Aromatic and Essential Oils Manufacturing Area. Details of the soil gas survey are included in the Appendices to the CH2M Hill RI (document M-575).

- Based on the results of the soil gas survey, 20 soil borings were advanced at the Central Tank Farm Area and the Aromatic and Essential Oils Manufacturing Area. These borings were advanced to the observed water table. Boring logs for each of the 20 borings are included in the Appendices to the

CH2M Hill RI (document M-575). In addition, soil samples were collected from three hand auger borings to the north, east, and west of boring C-41.

J. Summarize Data Gaps

Pilot Study Data Gaps:

Historical - There is sufficient historical information to ascertain past and present site uses.

Geologic Data - Available data is sufficient to geologically characterize site soils for purposes of fill/soil acquisition for the pilot study.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data- Geotechnical data gaps for the pilot study for this site include laboratory data needed for design of the soil washing system.

Hydrogeological Data - Available data is sufficient to characterize the site hydrogeologically for purposes of soil acquisition for the pilot study.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - Existing data are sufficient to identify areas with significant volumes of soil containing radionuclides of concern which exceed the cleanup level.

Environmental Data - Sufficient data exists to characterize site soils and groundwater for pilot study (including disposal) and health and safety purposes.

Design Data Gaps:

Historical - See Pilot Study Data Gaps.

Geologic Data - It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Geophysical Data - See Pilot Study Data Gaps.

Geotechnical Data - Borings were made in several hundred locations across this site, generally ranging between 4 feet and 15 feet deep below ground surface. Proposed excavation depths generally range from shallower excavations of 2.5 feet to 6 feet below ground surface, to deeper excavations ranging between 9 and 15.5 feet below grade. Therefore, additional subsurface information is needed on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to the New York, Susquehanna & Western Railroad tracks, rail spurs traversing the site (if they require salvage), New Jersey State Route 17, Hunter Avenue, or the many buildings and structures on site to be protected, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement. Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - Available data is sufficient to characterize the site hydrogeologically for purposes of remediation design.

Civil/Survey Data - See Pilot Study Data Gaps.

Underground Utility Data - See Pilot Study Data Gaps.

Radiological - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

Environmental Data - It may be necessary to obtain additional data to characterize site soils and groundwater for remediation design (including disposal issues) and health and safety purposes.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Stepan Chemical Company

Property Address: 100 W. Hunter Ave.

County/State: Bergen County, New Jersey

Property Use:

Company Name: Stepan Chemical Company

Company Contact Name : John O'Brien

Company Contact Address/Phone No.: (201) 845-3030

Current Property Use: Stepan's chemical processes include various extractions for natural flavorings used in soft drink products, as well as the manufacture of fatty acid esters for the cosmetic, personal care, and food industries.

Hours of Operation: Not known

Past Uses: Used by the Maywood Chemical Works from 1916 to 1956 for use in manufacturing industrial products such as mantles for gas lanterns. The property was purchased by Stepan Company in 1959.

Property Description:

Lot Size: Approx. 18 acres

No. of Buildings : Approx. 10 buildings

Building(s) size (each): Unknown

Year built: Varies (unknown)

Zoning: Commercial/Industrial

Uses of Adjacent Properties:

North:	Railroad line & residential properties
East:	Commercial businesses
South:	Sears distribution center (included in Maywood Superfund Site)
West:	MISS (DOE-owned property; included in Maywood Superfund Site).

Nearest structure on adjacent properties and each side of site boundary:
Commercial and residential buildings and a railroad line

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property?

Type of equipment: Not known
Equipment ID No.:
Installation Date:
Labels:
Fluid volume:

Is there any secondary containment?

Is any of the equipment leaking or damaged? If so, describe:

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property?

	Tank 1[a]	Tank 2	Tank 3
Tank capacity:	7500 Gal	250 Gal	2,500 Gal.
Substance Stored:	Alcohol	Gasoline	Gasoline
Installation Date:	Unknown	Unknown	Unknown
Registration (Y/N)	Unknown	Unknown	Unknown
Corrosion protection	Unknown	Unknown	Unknown
Single or double-walled			
Leak detection tests (Y/N)	Unknown	Unknown	Unknown
Results of testing:			

a. Tank 1 was abandoned in place (date unknown).

	Tank 4	Tank 5	Tank 6
Tank capacity:	50,000 Gal	550 Gal	
Substance Stored:	No.4 Fuel	Gasoline	
Installation Date:	Unknown	Unknown	
Registration (Y/N)	Unknown	Unknown	
Corrosion protection	Unknown	Unknown	
Single or double-walled			
Leak detection tests (Y/N)	Unknown	Unknown	
Results of testing:			

Three additional tanks were in place at Stepan, but have been removed. All tank information comes from the Stepan RI performed by CH2M Hill (document M-575).

Any known history of leaks ? ______

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Not known

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:

Were there past operations conducted on the property that required the use of USTs? If so, describe:

Are there any USTs removed from service, but left in the ground?

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? No

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).

Any history of leak or discharge from ASTs?

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Benzene, methanol, sulfuric acid, sodium hydroxide, #4 fuel oil, ethylene glycol, gasoline, diesel fuel. Quantities are not known.

Describe condition of containers (is there any corrosion or leakage?)
Not known.

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Not known.

Hazardous Waste Storage and Disposal

EPA Identification number for site: S101898285

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
Not known	Not known	Not known

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Not known.

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Not known.

Water and Wastewater

Are there any sanitary or septic systems on the site?
Not known.

Note source of water for the site, and identify on-site wells
Stepan Company has a surface water intake of approx. 2000 gpm from the Saddle River.

Note if site falls within floodplain, describe direction of runoff.
Site does not fall in 100-year or 500-year flood hazard area.

Note if any water quality data is available for on-site wells.

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		X	FEMA
USGS maps		X	Contact USGS
State wetland maps		X	NJDEP
Federal wetland map		X	EPA
Sanborn historical maps		X	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	Potentially from CH2M Hill
Survey drawing including topography		x	Potentially from CH2M Hill
Aerial photographs (historical)		x	Potentially from CH2M Hill
Utility Layouts:			
Water		x	Local utility company
Sewer Lines		x	Local utility company
Gas Lines		x	Local utility company
Electric Lines		x	Local utility company
Telephone Lines		x	Local utility company
Cable Lines		x	Local utility company
Above-ground Storage Tanks		x	Local utility company
Underground Storage Tanks	x		Local utility company
Building structural drawings		x	Potentially from property owner
Foundation Drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds	x		
Metals	x		
PCBs	x		
Pesticides	x		
Sampling for Constituents of Concern in Groundwater:			
Radionuclides	x		
Organic Compounds	x		
Metals	x		
PCBs	x		
Pesticides	x		
Geophysical Investigations			
GPR Surveys		x	
Magnetometer Surveys	x		

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction			PDI Investigation
Specific Gravity			PDI Investigation
Consolidation			PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		
Water table fluctuations	x		
Direction of groundwater flow	x		
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

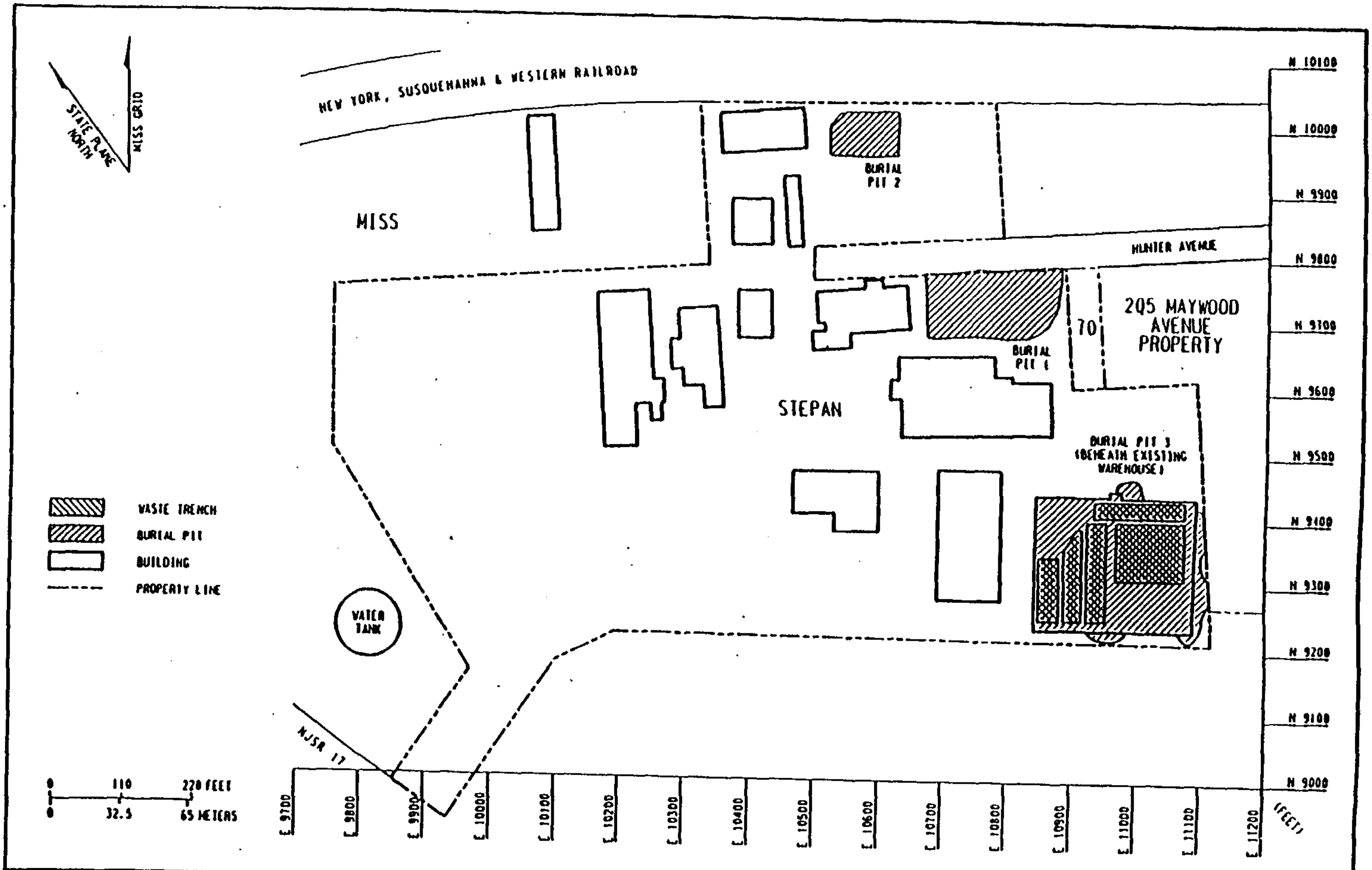

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Figure 1-8
Burial Pit Locations on the Stepan Company Property

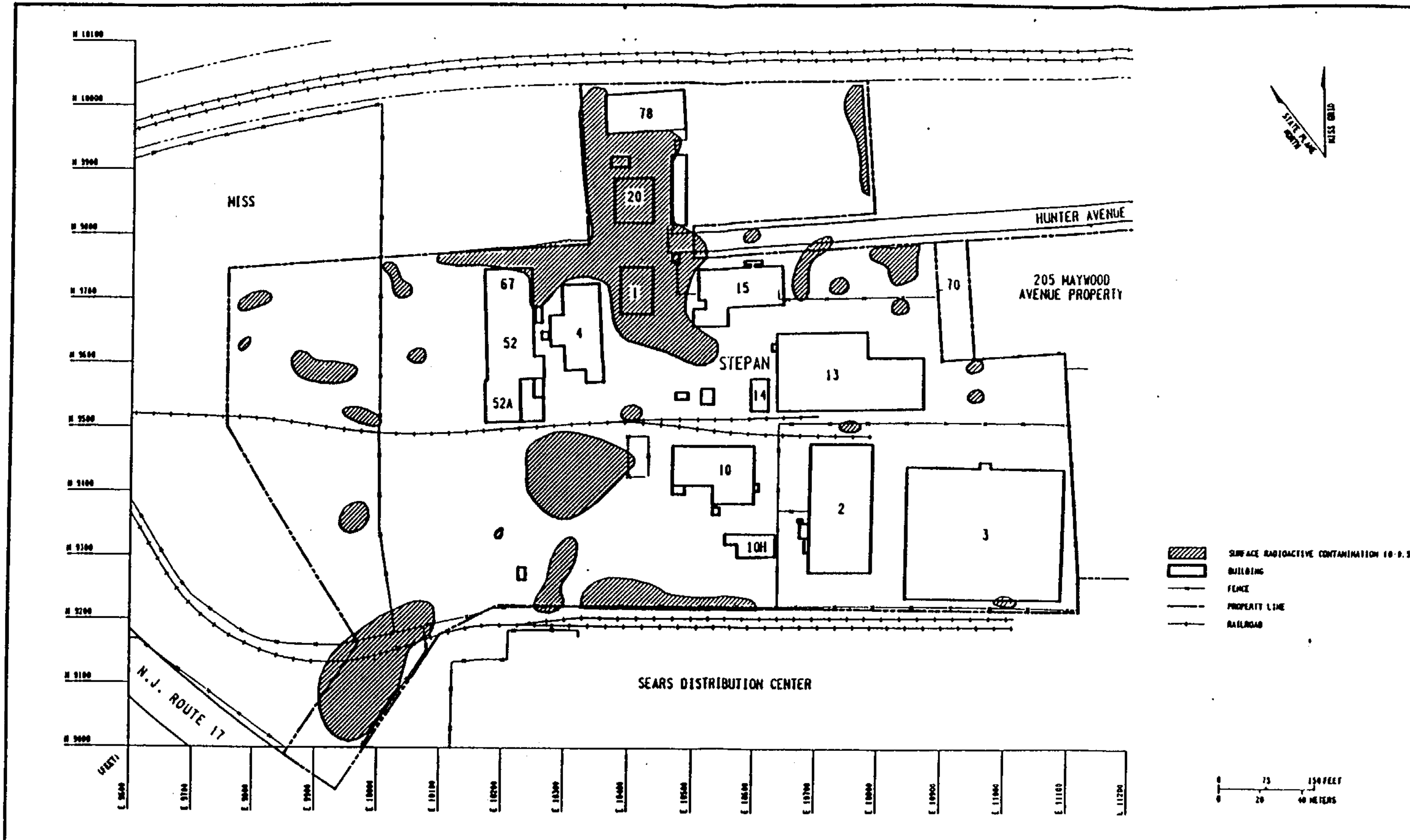

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Figure 4-16
Stepan Property Areas of Surface Radioactive Contamination

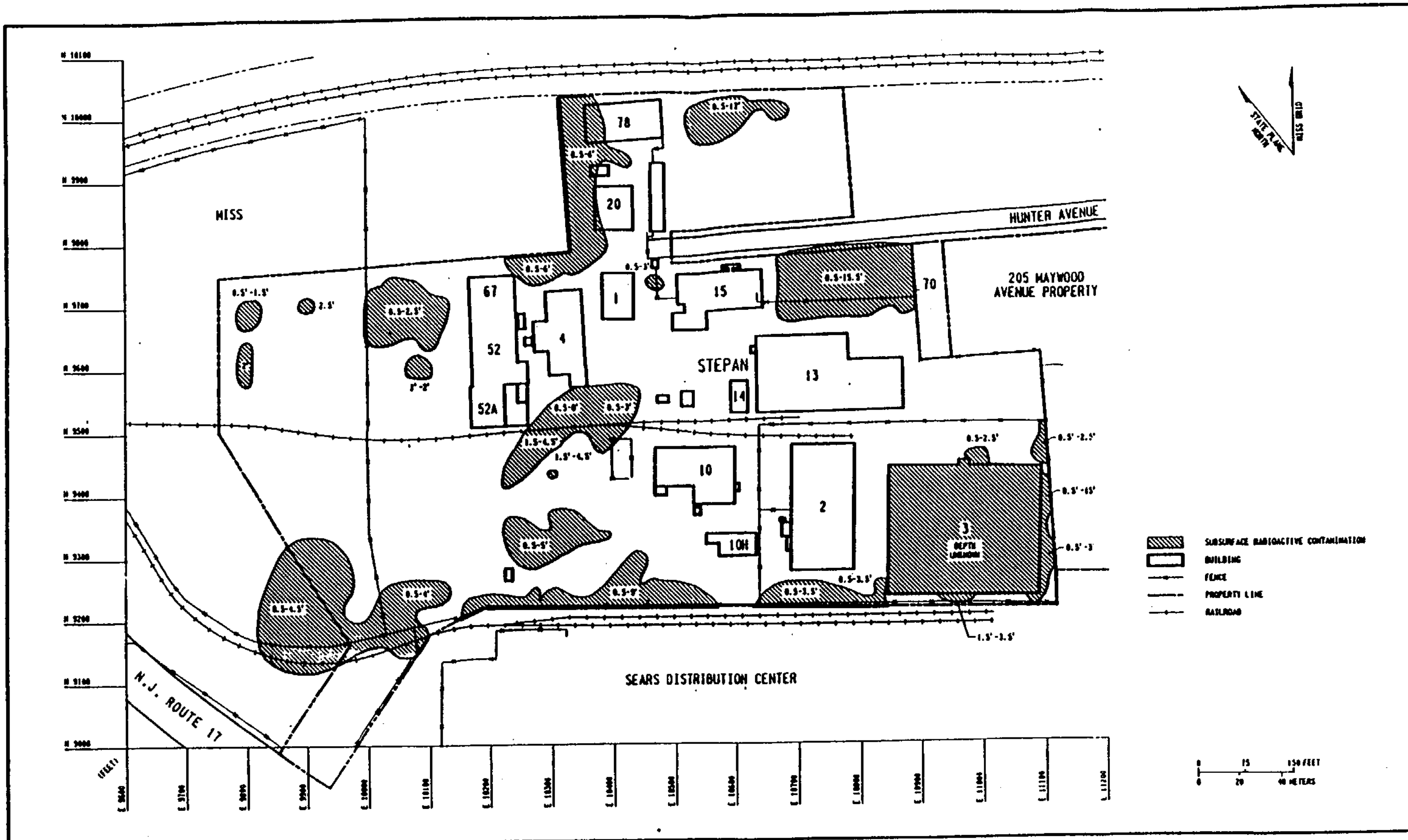

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Figure 4-18
Stepan Property Subsurface Radioactive Contamination

Property Cluster No. 11

- 205 Maywood Avenue (Myron Manufacturing)
- 50 West Hunter Avenue
- 61 West Hunter Avenue

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

205 Maywood Avenue/50 & 61 West Hunter (Myron Manufacturing)

A. Description of Property

Myron Manufacturing owns three parcels of property: 205 Maywood Avenue, and 50 and 61 West Hunter Avenue. The parcel at 61 West Hunter Avenue is leased to several tenants, and the parcel at 50 West Hunter Avenue houses telemarketing personnel engaged in the sale of Myron products. The 205 Maywood Avenue property houses the main manufacturing facility and offices. Myron employs more than 150 people in the manufacture, sales, and distribution of appointment books, desk calendars, and other desk accessories. The manufacture of these products includes cutting of vinyl for covers, gilding, stitching, typesetting, imprinting, and assembly of products ranging from appointment books to personalized ball-point ink pens. Packaging and shipping activities are also conducted in the 205 Maywood Avenue facility. This facility is approximately 135,000 square feet (M-698)

At 50 West Hunter Avenue, employees are engaged in telemarketing sales for various Myron products. Employees are present on two shifts, but the evening shift personnel are few. The building is one story and is constructed of cinder block with brick veneer. It contains small offices, a large training room, an open area occupied by telemarketing employees, restrooms, and an employee lunchroom. Many areas of the building are unused (M-575).

The property at 61 West Hunter Avenue contains a two-story brick veneer building. The tenant for this building is Design House. Employees of this company are engaged in the sales and distribution of a variety of office and desk accessory products (M-698).

B. Site-Specific Geology

There is no site-specific geological information for this property.

A general stratigraphic description of the area is as follows:

"The area is located within the Piedmont Physiographic Province, also known, in New Jersey, as the Newark Basin. It consists of sandstones, shales, mudstones and conglomerates covered with unconsolidated materials consisting of fill, recent deposits, glacial stratified and unstratified deposits, and soil residual" (M-575).

C. Site Specific Geophysical

There is no site-specific geophysical information for this property.

D. Site-Specific Geotechnical

There is no site-specific geotechnical information for this property.

E. Site-Specific Hydrogeology

There is no site-specific information for this property.

F. Civil/Survey Information

There is no civil/survey information for this property.

G. Underground Utilities

There is no site-specific underground utility information for this property.

H. Previous Investigations (Radiological)

Radiological data were presented by Bechtel National, Inc. (BNI) in the Remedial Investigation Report For The Maywood Site (M-209, DOE/OR/21949-33, December 1992). It describes their investigation, which consisted of outdoor exposure rate measurements with a 2 inch x 2 inch sodium iodide coneshielded gamma detector and collection of surface and subsurface soil for thorium, radium and uranium analysis.

Surface soil samples analyzed for ^{232}Th, ^{226}Ra, and ^{238}U ranged from 0.6-9.8 pCi/g, less than 0.6-4.1 pCi/g, and less than 3-less than 9.3 pCi/g, respectively. Subsurface soil samples contained 0.4-31 pCi/g, less than 0.1-2.5 pCi/g, and less than 1.4-less than 9.7 pCi/g, respectively, of the same three radionuclides.

As can be seen on the attached figure, two areas were identified with contaminated materials. Contamination was estimated to a depth of two feet adjacent to the northwest portion of the building at 205 Maywood Avenue. A small area on one of the West Hunter parcels was found to contain contamination in the surface soil.

Document M-698 contains indoor radon and exposure rate data collected at this property. Forty-five radon samples were collected; radon concentrations ranged from less than 0.2-0.5 pCi/L. Three thoron samples resulted in less than 0.6-0.7 pCi/L. Interior exposure rates were in the range due to natural background, and exterior exposure rates ranged from 5-13 μR/h.

I. Previous Investigations (Environmental)

There is no site-specific environmental information for this property.

J. Summarize Data Gaps

Historical Data - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geological Data - No site-specific geological data is available. Geologic data is required to quantify volumes of fill/soil to be acquired for remedial design.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data – The volume of contaminated soil on the property is relatively small, and previous data indicate that the depth of contamination does not extend beyond two feet below the ground surface. A small amount of confirmatory data are needed to support the remedial design for the property. Soil samples collected with hand augers for radionuclide analyses will fill the data gaps.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Work Plan. The site is listed as a small quantity generator under RCRIS, and is also listed in EPA's FINDs database.

References

M-209, Remedial Investigation Report For The Maywood Site, Bechtel National, Inc., December 1992.

M-575, Maywood Chemical Company Site, Final Remediation Investigation Report, CH2M Hill, November, 1994).

M-698, Results of Radon and Gamma Radiation Measurements at 19 Commercial and Governmental Properties of the Maywood Site, Bechtel National, Inc., August 1994.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Myron Manufacturing

Property Address: 205 Maywood Ave/50 & 61 West Hunter

County/State: Maywood, New Jersey

Property Use:

Company Name: Myron Manufacturing – owned by Myron and Elaine Adler

Company Contact Name : Dan Hurtubise, Facilities Manager, William Adler

Company Contact Address/Phone No.: (201) 843-6464, (201) 843-6464

Current Property Use: Telemarketing, manufacture, sale and distribution of appointment books, desk calendars, and other desk accessories.

Hours of Operation: Three shifts: M-TH 7:00 am-5:30 pm, M-TH 7:00 pm-5:30 am, and a F/Sat/Sun shift

Past Uses: Unknown

Property Description:

Lot Size: Unknown

No. of Buildings : Three

Building(s) size (each): 135,000 ft ^{2}, 205 Maywood, 21,250 ft^2, 50 W. Hunter, 21,000 ft^2, 61 W. Hunter

Year built: 1982

Zoning: Commercial

Uses of Adjacent Properties:

North:	West Central Avenue & residential properties
East:	Maywood Avenue & residential properties
South:	149-151 Maywood Avenue
West:	100 West Hunter - Stepan

Nearest structure on adjacent properties and each side of site boundary:
North - Residential housing
East - Residential housing
South - Commercial building
West - Stepan building

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ________

Equipment ID No.: ________

Installation Date: ________

Labels: ________

Fluid volume: ________

Is there any secondary containment?
Unknown

Is any of the equipment leaking or damaged? If so, describe: Unknown

Is there any known history of leaks or discharges?
Unknown

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ? Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe: Unknown

Were there past operations conducted on the property that required the use of USTs? If so, describe: Unknown

Are there any USTs removed from service, but left in the ground? Unknown

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). Unknown

Any history of leak or discharge from ASTs? Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: Unknown

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste
(Includes biological or medical)		

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Unknown

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Water and Wastewater

Are there any sanitary or septic system on the site?
Unknown

Note source of water for the site, and identify on-site wells
Municipal

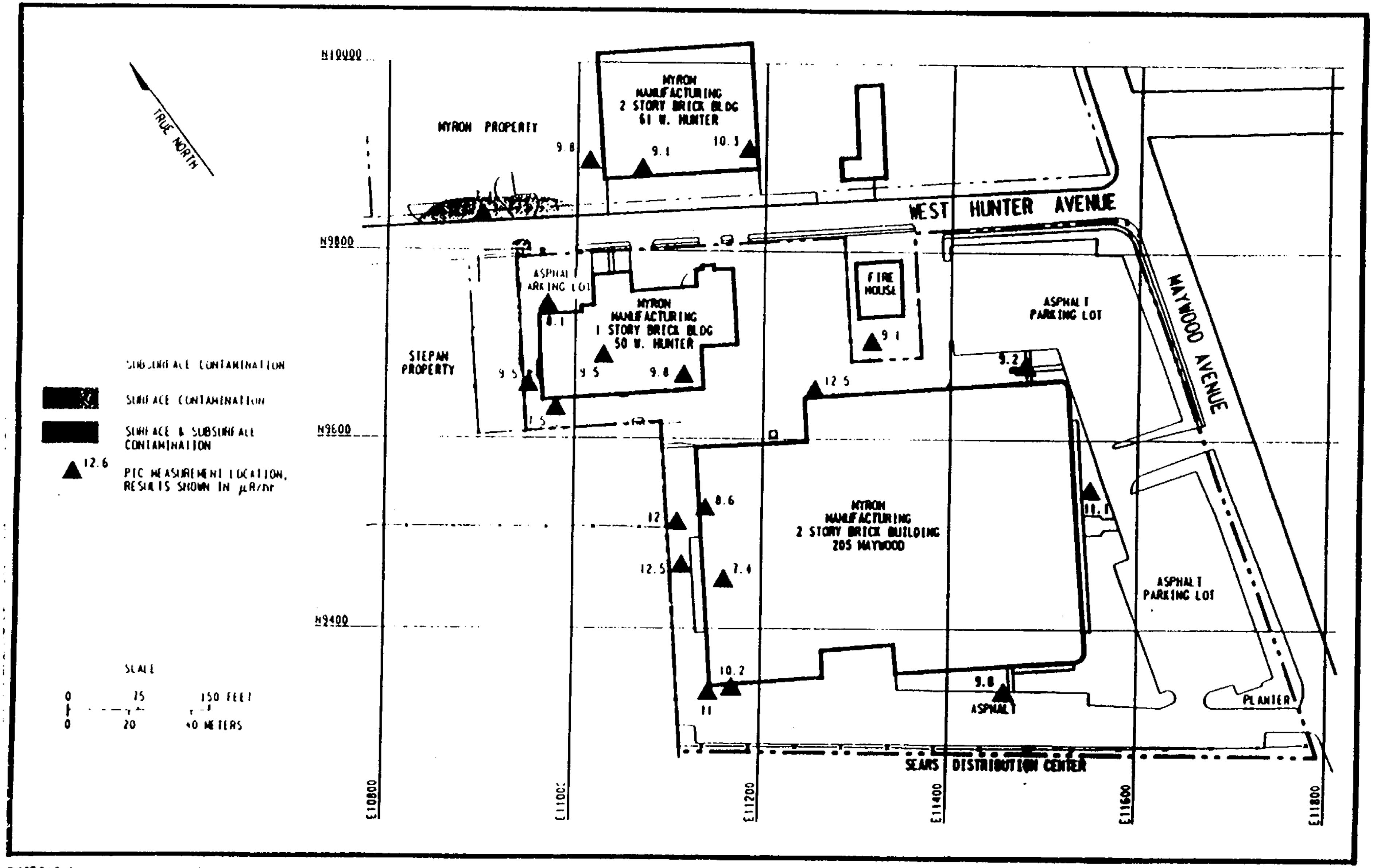
Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
Unknown

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

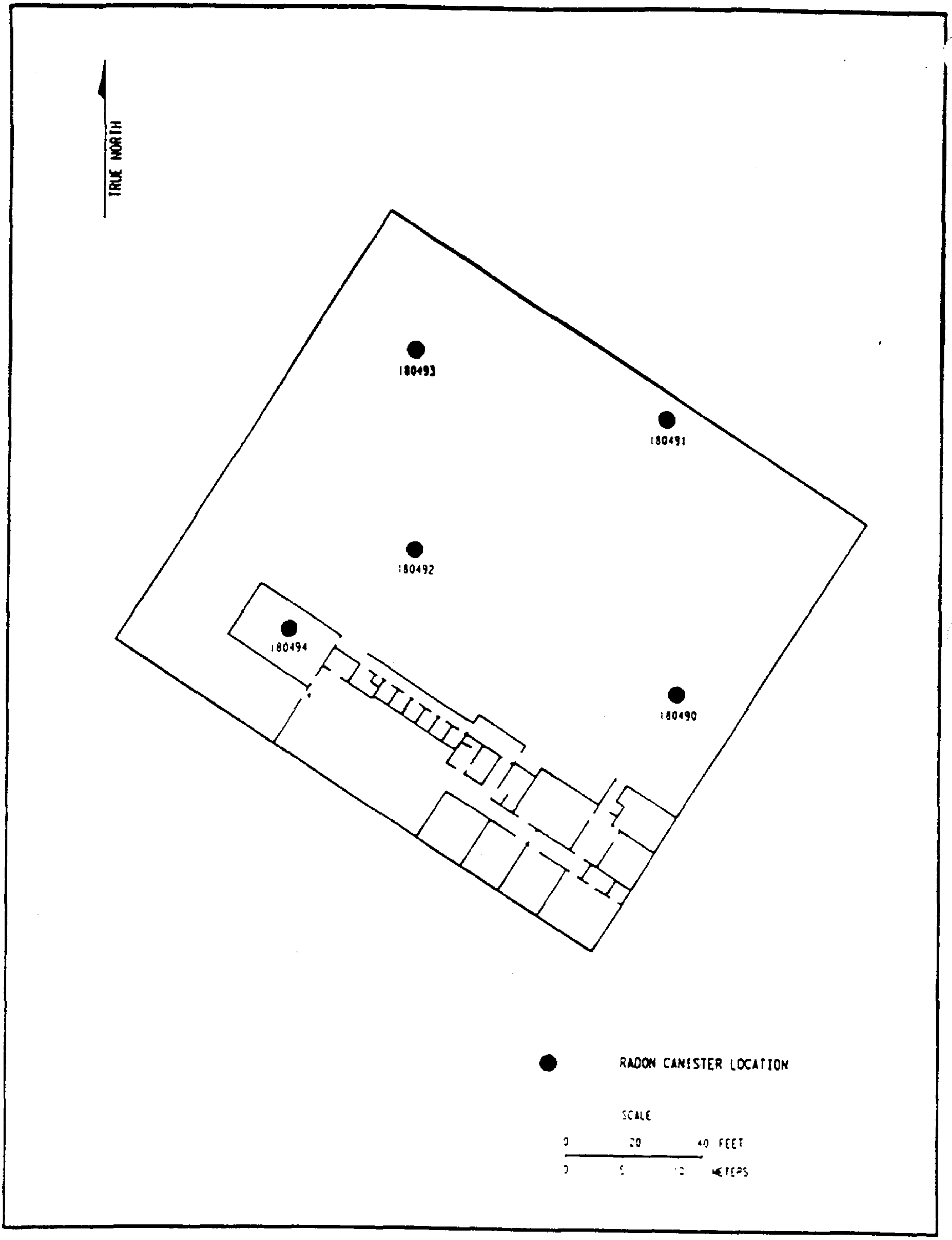
DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County
Gas Lines		x	Local Utility Company
Electric Lines			Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings			Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides	x		
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	Groundwater Investigation
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing	x		
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging		x	PDI Investigation



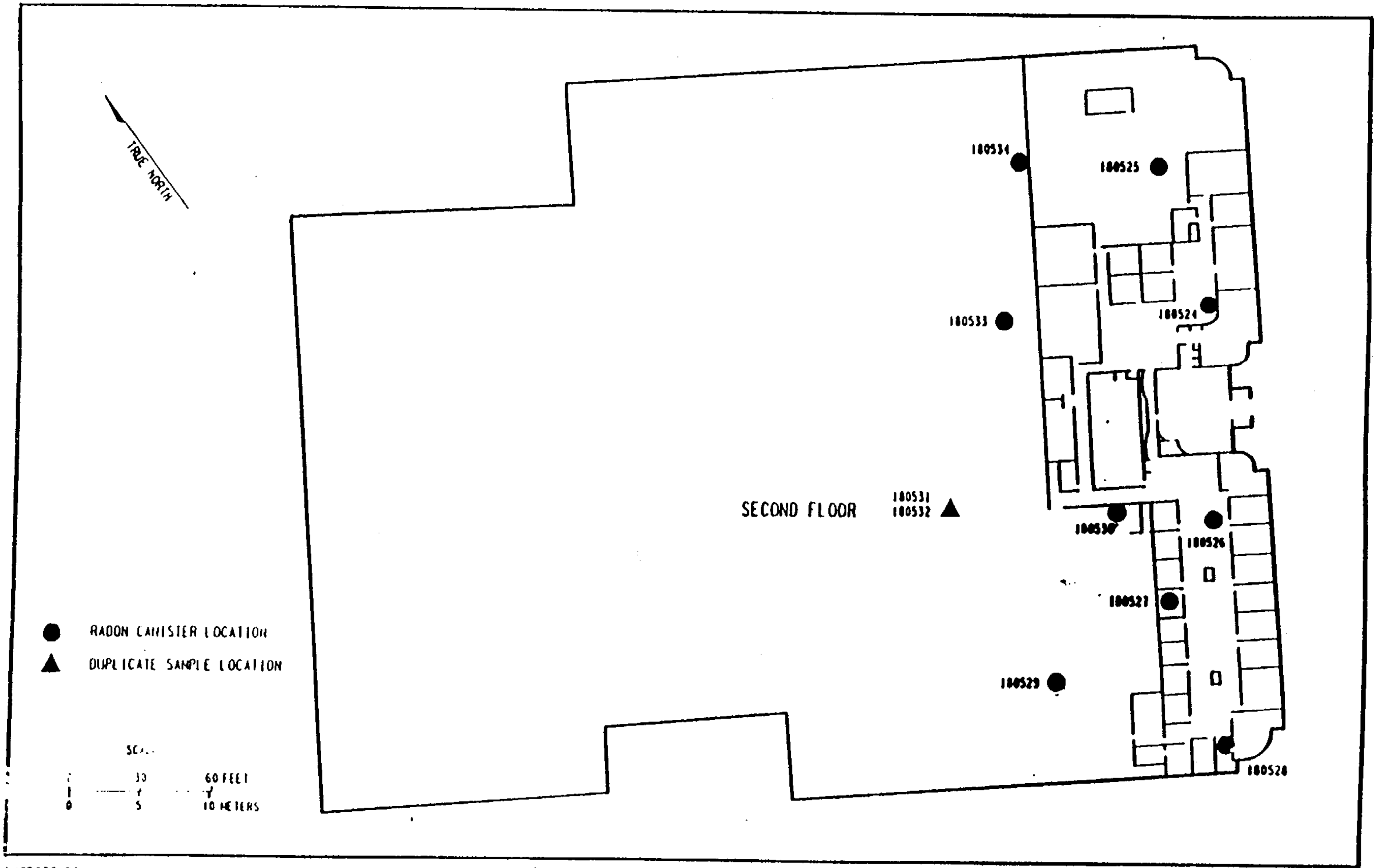
R43F015.DGN

Figure 4-44
PIC Measurement Locations and Areas of Contamination at the Myron Manufacturing Properties
50 and 61 West Hunter Avenue and 205 Maywood Avenue



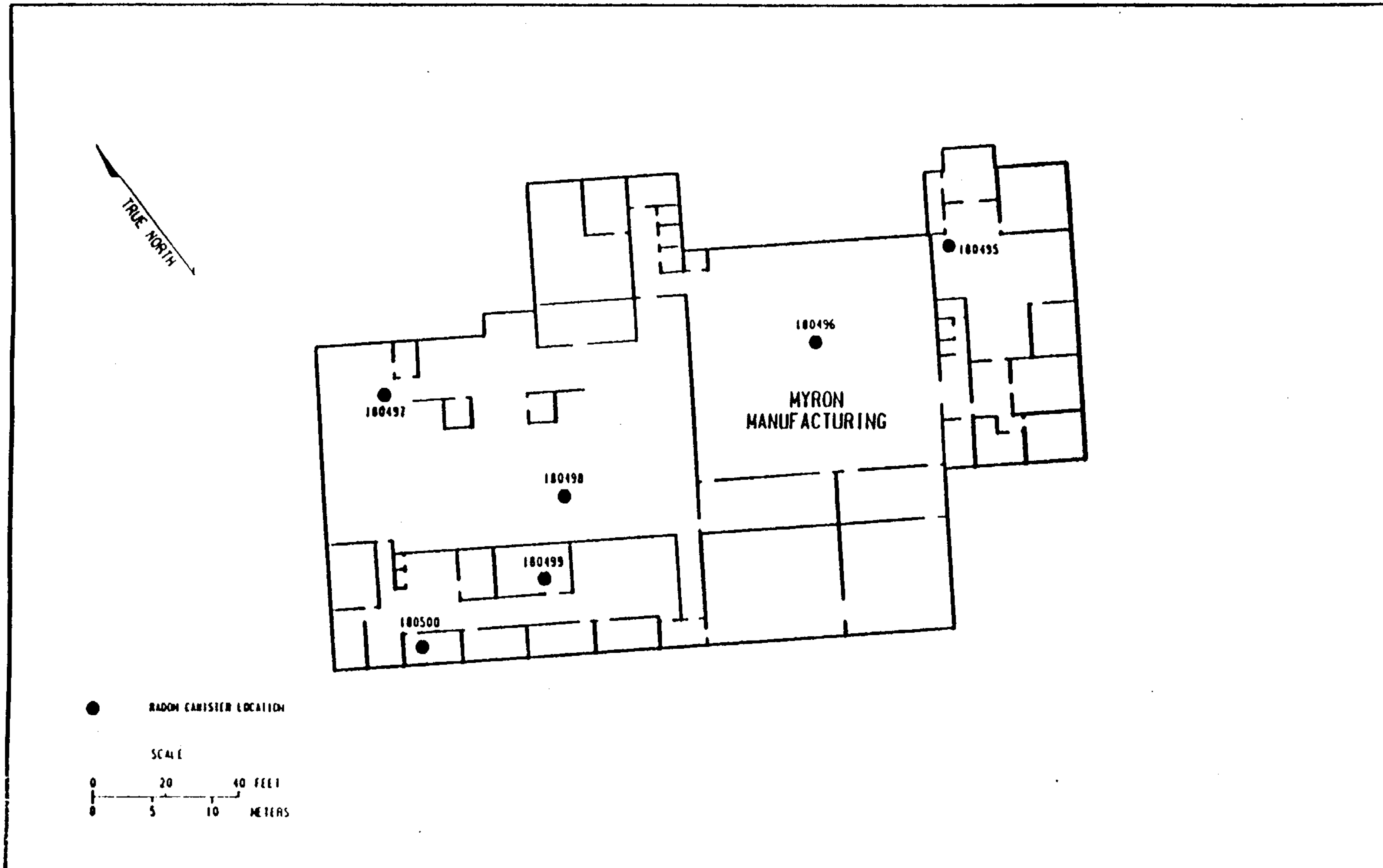
R43F080.DGN

Figure 4-46
Locations of Radon Canisters at Myron Manufacturing
61 West Hunter Avenue (First Floor)



N43F075.DGN

Figure 4-48
Locations of Radon Canisters at Myron Manufacturing
205 Maywood Avenue
(Second Floor)



R43F081.DGN

Figure 4-45
Locations of Radon Canisters at Myron Manufacturing,
50 West Hunter Avenue

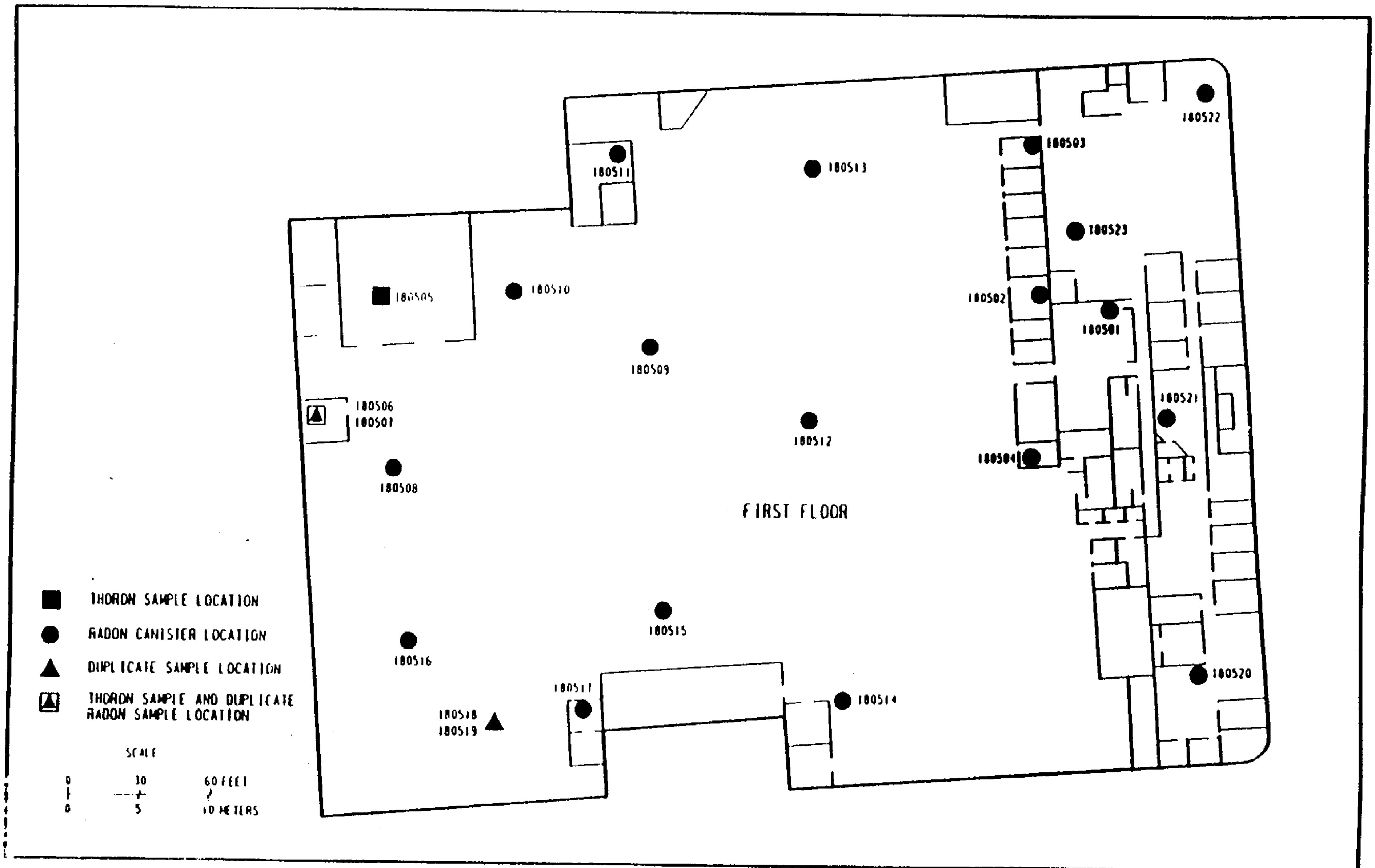


Figure 4-47
Locations of Radon Canisters at Myron Manufacturing
205 Maywood Avenue

Property Cluster No. 12

- 100 West Hunter Avenue (Maywood Interim Storage Site [MISS])
- New York, Susquehanna & Western Railroad
- New Jersey Route 17

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

MAYWOOD INTERIM STORAGE SITE (MISS)

A. Description of Property

The Maywood Interim Storage Site (MISS), located at 100 West Hunter Ave., comprises 11.7 acres and is bisected by the boundary between the Township of Rochelle Park and the Borough of Maywood. The property is bounded by a railroad line (the New York, Susquehanna & Western Railroad) to the northeast, by the Stepan property to the south and east, and by Route 17 to the west. The nearest residential area is approximately 150 feet northeast of MISS. Most of the MISS is grass-covered. The site is surrounded by a 6- to 8- foot high chain link fence. MISS contains two buildings (Building 76 and a pumphouse), temporary office trailers, and a water reservoir. The water reservoir and pumphouse are still in use by Stepan Company. Two railroad spurs traverse the central and southern portion of the site; one services the Stepan Company, and the other a Sears warehouse adjacent to Stepan. Westerly Brook, which flows under the northern edge of MISS via a concrete pipe, empties into Saddle River, a tributary of the Passaic River.

The MISS was established in 1984, when DOE negotiated an agreement with the Stepan Company for access to a portion of their property. The land was transferred to DOE ownership in September 1985 to provide an interim storage site for waste from DOE decontamination activities until a permanent disposal site was found. Contaminated materials removed from the Ballod property and from vicinity residential properties in Maywood and Rochelle Park were brought to the site from 1984 to 1986. The soil storage pile covered approximately 1.5 acres, was 20 feet high, and contained 34,900 yd^3 of low-level radioactive waste. A leachate collection system within the pile and a liner system beneath the pile intercepted any seepage. Removal of the soil pile was initiated in October 1994 by DOE, and completed in December 1996. The site is currently being used as a staging area for on-going remediation activities for vicinity residential properties.

Surface topography at the MISS is generally flat, ranging in elevation from approximately 51 to 67 feet above mean sea level (MSL). The highest elevations are in the northeastern portions of the site. Small mounds and ditches are the result of process waste that was stored by the former Maywood Chemical Works. At least two partially buried structures (cisterns or cesspools) remain from these waste storage operations.

B. Site-Specific Geology

The Maywood Site is located in northeastern New Jersey within the glaciated section of the Piedmont Plateau. The terrain is generally level, with minor relief. Elevations range from 45 to 75 feet. Site-specific geologic information was collected by Bechtel National, Inc. in 1985 (document M-019), 1987 (document M-120) and in 1991 (document M-209). This information is summarized in the following paragraphs.

The sediments underlying the MISS are divided into two stratigraphic units: a bedrock unit composed of interbedded, well-cemented sandstone, and siltstone of Triassic/Jurassic age (Passaic Formation), and an overlying section of unconsolidated clastic materials of Pliocene-Pleistocene age. These units are separated by an erosional unconformity. The surface of the bedrock unit was extensively eroded by both glacial and fluvial processes, and the unconsolidated sediments overlying the bedrock surface are composed of clastic materials deposited by these processes.

There is a bedrock low (elevation of approximately 34-44 feet AMSL) sloping toward the west under the far western and southwestern portions of MISS. A bedrock high extends across the MISS, in the area of the former waste pile. The bedrock in this area reaches an elevation of 50 feet AMSL. The surface material at MISS is fill mixed with waste material from process operations at the former MCW.

C. Site Specific Geophysical

No geophysical data was located.

D. Site-Specific Geotechnical

No geotechnical information was located.

E. Site-Specific Hydrogeology

BNI installed groundwater monitoring wells on MISS at various times from 1984 to 1991. The following information is compiled from BNI reports M-019, M-150, and M-209.

Both the bedrock and the overlying unconsolidated material are sources of groundwater for the Maywood area. The shallow groundwater flow system at MISS is in the unconsolidated sediments and the shallow Passaic Formation bedrock and occurs under unconfined, water table, and partially confined conditions. No major confining layers were identified, and saturation is continuous from the water table surface to at least the maximum depth of investigation (60 feet below ground surface (bgs)) in the bedrock. Depth to water is shallow and ranges from approximately 2 to 15 feet bgs. Water level elevations range from 39 to 54 feet above MSL. Saturated thickness in the unconsolidated sediments ranges from 5 to 15 feet, generally decreasing to the east, where the sediments thin onto a bedrock high on the Stepan property.

The potentiometric level of the semi-confined bedrock groundwater system ranges from 40 to 66 feet above MSL. Seasonal fluctuations typically range from 1.5 to 6 feet during a year. Water levels are generally lowest from May through September, rise during late November and December, and peak in February and March. Average hydraulic gradients are generally low and indicate groundwater flow to the west and southwest toward the Saddle River, where groundwater is discharged.

Field hydraulic conductivity tests were performed in the overburden materials and the bedrock in 1991. Estimates of horizontal hydraulic conductivity of the overburden materials were obtained from falling head and recovery tests in completed wells. Vertical hydraulic conductivity values of the overburden material were calculated from falling head tests using open-end casing in boreholes. Hydraulic conductivity tests in the bedrock consisted of constant head pressure tests (packer), constant head gravity, falling head, and recovery tests.

F. Civil/Survey Information

No surveys were located for the MISS.

G. Underground Utilities

No maps showing underground utilities were located.

H. Previous Investigations (Radiological)

The 1992 Remedial Investigation Report for the Maywood Site (Bechtel National, Inc., DOE Contract No. DE-AC05-91OR21949) consisted of outdoor exposure rate measurements, collection of surface and subsurface soil, surface water, sediment, groundwater samples for thorium, radium and uranium analysis, and radon/thoron flux measurements. Boreholes were installed and downhole gamma count rate data were collected. The annual average exposure rate at MISS was 27 mR on-site and 58 mR at the fence line, excluding the annual background of 68 mR. The attached figures depict the locations of retention ponds and areas with surface and subsurface areas of contamination

A total of 27 boreholes were drilled in the MISS storage pile. A total of 31 wells were sampled during previous investigations and two wells were installed and sampled during the RI. The results of surface water and sediment samples conducted at one upgradient and three downgradient locations under the routine monitoring program indicate no evidence that radioactvie contaminants are migrating from MISS. Radiological characterization of the groundwater, based on DOE's routine environmental monitoring program, indicated that total uranium, ^{226}Ra, and ^{232}Th concentrations were comparable at upgradient, off-site, and downgradient wells. The only exception was well B38W12 and another well which are located on off-site properties.

A total of 192 radon flux measurements were performed. Of the 192, only 5 yielded radon flux rates which exceeded the compliance limit of 20 pCi/m^2/s.

The results of the RI performed by BNI in 1986 and 1992 indicated that the areal extent of contamination includes virtually the entire MISS property. The primary sources of contamination are former retention ponds and mounds of solid material. There are four retention ponds that were located along the northern and western perimeters of the property.

Retention pond A was located along the north-central property line of MISS. This pond was approximately 325 by 150 feet. The northern limit of this area has been defined by 16 boreholes, but the southern boundary of the pond is not well defined because it extended beneath the interim storage pile. No drilling has been performed along the southern boundary. The maximum depth of contamination was 8 to 9 feet along the eastern and northern perimeters of the pond. Subsurface contamination extends to a maximum depth of 10.5 feet, with a maximum gamma count rate recorded at a depth of 5 feet in borehole C-021.

Retention pond B was located in the northwestern corner of the MISS property. This former retention pond was comprised of two areas separated by a central dike. Limited subsurface information is available for this area. A pad for a second interim storage pile has been constructed and limits access in this area. Five boreholes have been drilled along the northwest and west perimeter, five in an isolated area on the southern edge, and three along the eastern margin of this former retention pond. The areal extent of the former pond is approximately 225 by 250 feet. Radioactive contamination extends to a maximum depth of 10.5 feet in the northwestern portion of the pond, with a maximum gamma count recorded at a depth of 7.5 feet in borehole MISS-71C.

Retention pond C was located south of the railroad spur, along the west-central property boundary. This pond was approximately 250 by 250 feet. Elevated concentrations of radionuclides were detected in this area from the surface to a depth of 2 feet, extending eastward approximately 100 feet from the western property line adjacent to Route 17 onto the MISS property. Elevated gamma count rates were recorded in the uppermost section of borehole MISS-81. Below 2 feet to a depth of 5 feet, contamination is localized in two separate lenses, along the northern and southern boundaries of the pond. These two lenses are separated by a layer of clean soil. Radioactive contamination increases with depth in both lenses. In the 5 to 10 feet interval, contamination covers essentially the entire area of the former retention pond and then tapers off into two separate areas in the 10 to 15 feet interval. Maximum gamma count rate measurements occurred in the 4 to 7 feet interval in two boreholes.

Former retention pond E is located in the extreme southwestern corner of the MISS property adjacent to Route 17. This area of contamination is approximately 300 by 120 feet. Radioactive contamination covers the entire surface area of the former retention pond. Gamma count rate measurements were very high in the first 2 feet of soil; measurements were greatly elevated over a significant portion of the area, increasing to a maximum at a depth of 1 to 2 feet in borehole MISS-43R. Gamma count rates in these boreholes decreased rapidly with depth below 2 feet and were near or less than the cleanup level at depths greater than 5 feet.

The fifth area of primary contamination surrounds the location of the former thorium processing building. The affected area is approximately 400 by 200 feet. Radioactive contamination in this area extends to a depth of 22 feet in isolated locations. Radioactive contamination in this area is the highest encountered on the property. Gamma count rate measurements were substantially elevated immediately adjacent to the building in the near-surface soils. Radioactive contamination decreases with depth but is present to a maximum depth of investigation in some isolated locations.

Several estimates have been made of the total volume of contaminated material at MISS; it most likely falls in the range from 60,000 - 100,000 cubic yards present in eight burial areas. In the scope of work prepared for the field demonstration project, the ACE estimated 102,531 cubic yards of contaminated material on the property.

I. Previous Investigations (Environmental)

Source: Maywood Interim Storage Site Annual Site Environmental Report, Calendar Year 1986, BNI, 06/87 (M-030)
No soil samples were analyzed for chemical parameters. Twelve groundwater monitoring wells were sampled quarterly for pH, total organic carbon (TOC), total organic halides (TOX), and specific conductance. Analyses were performed annually for New Jersey priority pollutants.

Source: Characterization Report for the Maywood Interim Storage Site, Maywood, New Jersey, BNI, 06/87 (M-120)
Soil samples were collected from 29 boreholes. Twenty-nine soil samples were analyzed for VOCs. Nineteen soil samples were analyzed for SVOCs, Pesticide/PCBs, and priority pollutant metals. Nineteen soil samples were analyzed for EP toxicity pesticides and metals, and 12 soil samples were analyzed for EP toxicity PCBs. In addition, 18 soil samples were analyzed for RCRA corrosivity, reactivity, and ignitability characteristics.

Source: Maywood Interim Storage Site Annual Site Environmental Report, Calendar Year 1987, BNI, 04/88 (M-032)
No soil samples were analyzed for chemical parameters. Thirteen groundwater monitoring wells were sampled quarterly for pH, total organic carbon (TOC), total organic halides (TOX), and specific conductance. Analyses were performed annually for New Jersey priority pollutants.

Source: Maywood Interim Storage Site Annual Site Environmental Report, Calendar Year 1988, BNI, 04/89 (M-096)
No soil samples were analyzed for chemical parameters. Eleven groundwater monitoring wells were sampled quarterly for pH, total organic carbon (TOC), total organic halides (TOX), and specific conductance. Analyses were performed annually for New Jersey priority pollutants.

Source: Maywood Interim Storage Site Annual Site Environmental Report, Calendar Year 1990, BNI, 09/91 (M-150)
Seventeen groundwater monitoring wells were sampled quarterly for pH, total organic carbon (TOC), total organic halides (TOX), specific conductance, and metals (beginning in Quarter 2). Analyses for volatiles and semi-volatiles were conducted during the 3rd quarter. Surface water monitoring was initiated during the 3rd quarter of 1990 for four locations. One of the locations was at the confluence of the Westerly Brook and the Saddle River; two locations were in Westerly Brook, one upstream of MISS, and the other downstream of MISS; and the fourth location was in Lodi Brook, south of I-80. Surface water was sampled quarterly for pH, specific conductance, TOC, TOX, and metals. Also, volatile and semi-volatile organic analyses were performed in the third quarter. Sediment samples were collected during the 4th quarter from the same locations as those analyzed for surface water. Sediment samples were analyzed for metals.

Source: Maywood Interim Storage Site Annual Site Environmental Report, Calendar Year 1992, BNI, 05/93 (M-254)
No soil samples were analyzed for chemical parameters. Fourteen groundwater monitoring wells were sampled in October 1992 for total metals, VOCs, SVOCs, pesticides, and PCBs.

Source: Maywood Remedial Investigation, BNI, 12/92 (M-209)
BNI drilled 34 boreholes (numbered as C001 to C034) for purposes of collecting soil samples for chemical analyses (see attached map for locations). To determine whether chemical constituents were commingled with radioactive contamination, the majority of the soil samples collected for chemical analysis were collected from known areas of radioactive contamination, based on a gamma log survey.

Metals: Seventy soil samples from 34 MISS onsite boreholes were analyzed for metals. Twenty-three metals were detected; 22 were found at concentrations above background. Of the 22 metal detected at concentrations above representative mean background, eight of the metals are discussed in detail in the source report as they are known to be constituents of thorium ores processed at MCW or lithium wastes disposed of onsite. The metals identified as components of thorium ores, uranium analogue metals, and lithium wastes are arsenic, cobalt, copper, lead, lithium, nickel, selenium, and vanadium. These metals occur mainly within a parcel that extends from an area east of Building 76 to an area west of the former storage pile.

Rare Earths: Seventy soil samples from 34 boreholes were analyzed for rare earth elements. Eleven rare earth elements were identified at levels above method detection limits; three (cerium, lanthanum, and neodymium) were identified at greater concentrations and frequencies. More than 60 percent of the above-background occurrences of cerium, lanthanum, and neodymium were in areas of radioactive contamination (near Building 76, around the perimeter of the former waste storage pile, and in isolated locations bordering Route 17).

Volatile Organic Compounds (VOCs): Seventy-three soil samples from 33 boreholes were analyzed for VOCs. Sampling depths ranged from near surface (0-2 feet) to a maximum of 21.5 feet (borehole C004) below grade. Eleven VOCs were detected; four compounds were found at concentrations above mean reference baseline. Toluene was detected with the greatest frequency (14 percent). In general, trace levels of VOCs onsite were detected in both radioactively contaminated and non-radioactively contaminated areas.

Semi-Volatile Compounds (SVOCs): Sixty-eight soil samples collected from 33 boreholes were analyzed for SVOCs. Twenty-nine SVOCs were detected, 18 at concentrations above reference baseline.

Total Petroleum Hydrocarbons (TPH): Forty-five soil samples collected from 32 boreholes were analyzed for TPH. One sample, collected from borehole C003 (0-10 foot interval) had a concentration of 1,110 mg/kg.

J. Summarize Data Gaps (Describe data gaps to support the pilot plant and remediation; What's missing?)

Pilot Study Data Gaps:

Historical - There is sufficient historical information to ascertain past and present site uses.

Geologic Data - Available data is sufficient to geologically characterize site soils for purposes of fill/soil acquisition for the pilot study.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data- Geotechnical data gaps for the pilot study for this site include laboratory data needed for design of the soil washing system.

Hydrogeological Data - Available data is sufficient to characterize the site hydrogeologically for purposes of soil acquisition for the pilot study.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Radiological Data - Existing data are sufficient to identify areas with significant volumes of soil containing radionuclides of concern which exceed the cleanup level.

Environmental Data - It may be necessary to obtain additional data to characterize site soils and groundwater for pilot study (including disposal) and health and safety purposes.

Design Data Gaps:

Historical - See Pilot Study Data Gaps above.

Geologic Data - It may be necessary to obtain additional geologic data in order to quantify volumes of fill/soil for site remediation design.

Geophysical Data - See Pilot Study Data Gaps.

Geotechnical Data - Borings were made in 34 locations across this site, ranging between 8 feet and 24 feet deep below ground surface, and averaging 15 feet. Proposed excavation depths generally range from 4.5 feet to 13.5 feet below ground surface. Therefore, additional subsurface information is needed on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to the New York, Susquehanna & Western Railroad tracks, rail spurs traversing the site (if they require salvage), New Jersey State Route 17, MISS Building 76, a reservoir tank and an adjacent pump house building, and any other structures to be protected, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement. Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - Available data is sufficient to characterize the site hydrogeologically for purposes of remediation design.

Civil/Survey Data - See Pilot Study Data Gaps.

Underground Utility Data - See Pilot Study Data Gaps.

Environmental Data - It may be necessary to obtain additional data to characterize site soils and groundwater for remediation design (including disposal) and health and safety purposes.

Radiological Data - In-situ surface and downhole gamma spectroscopy data are needed to support design. Absent additional data, generation of accurate cut lines will not be possible.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: Maywood Interim Storage Site (MISS)

Property Address: 100 W. Hunter Ave.

County/State: Bergen County, New Jersey

Property Use:

Company Name: Army Corps of Engineers (ACE)

Company Contact Name : Allen Roos

Company Contact Address/Phone No. : (212) 264-0120

Current Property Use: Established as an interim staging and storage area for residual radioactive materials excavated from various Maywood Site vicinity properties.

Hours of Operation: N/A

Past Uses: Used by the Maywood Chemical Works from 1916 to 1956 for manufacturing industrial products such as mantles for gas lanterns. The property was purchased by Stepan Company in 1959. Property was purchased from Stepan Company by DOE in 1985.

Property Description:

Lot Size: Approx. 4.7 hectares (11.7 acres)

No. of Buildings : Two buildings and a reservoir

Building(s) size (each): Building 76 (size unknown), pumphouse (used by Stepan Company, size unknown), effluent reservoir (used by Stepan Company, size unknown)

Year built: Not known

Zoning: Commercial/Industrial

Uses of Adjacent Properties:

North: A railroad line (the New York, Susquehanna & Western Railroad) bounds the site to the north. There is a residential zone north of the railroad .

East: Stepan Company property (industrial)

South: Stepan Company property (industrial)

West: Route 17 bounds the site to the west. There is a commercial/residential zone west of Route 17.

Nearest structure on adjacent properties and each side of site boundary:
Industrial, commercial and residential properties and a railroad.

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property?

Type of equipment: Not known

Equipment ID No.:

Installation Date:

Labels:

Fluid volume:

Is there any secondary containment?

Is any of the equipment leaking or damaged? If so, describe:

Is there any known history of leaks or discharges?

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Not known

	Tank 1	Tank 2	Tank 3
Tank capacity:	1000 Gal.	50,000 Gal.	2000 Gal.
Substance Stored:	Leaded Gasoline	Heating Oil (No.2)	Heating Oil (No.2)

Installation Date:	01/01/61	01/01/61	01/01/78
Registration (Y/N)	Y	Y	Y
Corrosion protection	N	Y	Y
Single or double-walled			
Leak detection tests (Y/N)	Unknown	Unknown	Unknown
Results of testing:			

	Tank 4	Tank 5	Tank 6
Tank capacity:	1000 Gal.		
Substance Stored:	Unleaded Gasoline		
Installation Date:	01/01/77		
Registration (Y/N)	Y		
Corrosion protection	Y		
Leak detection tests (Y/N)	Unknown		
Results of testing:			

Note: Tank information is based upon a database report generated by EDR, Inc. The information may not be complete, and tank status may have changed since the database was last updated.

Any known history of leaks ? ______________________________

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? Unknown.

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:

Were there past operations conducted on the property that required the use of USTs? If so, describe: ______________________________

Are there any USTs removed from service, but left in the ground?

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Yes, a water reservoir tank

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). Unknown

Any history of leak or discharge from ASTs? Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: There are no chemicals handled on site.

Describe condition of containers (is there any corrosion or leakage?)

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Hazardous Waste Storage and Disposal

EPA Identification number for site: 1000332264; NJ0891837981

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste

Waste quantities reported in 1995 (Source: EDR, Inc.)

D001	828505 Lbs.	Not known
D006	1280 Lbs.	Not known
D007	5005 Lbs.	Not known
D008	1280 Lbs.	Not known
D018	1280 Lbs.	Not known
D035	1280 Lbs.	Not known

Describe condition of hazardous waste containers (is there any corrosion or leakage?)
Not known

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Not known

Water and Wastewater

Are there any sanitary or septic system on the site?

Note source of water for the site, and identify on-site wells

There are several on-site monitoring wells.

Note if site falls within floodplain, describe direction of runoff.

Site does not fall within the 100- or 500- year flood hazard area.

Note if any water quality data is available for on-site wells.

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	Potentially from Bechtel National, Inc.
Survey drawing including topography		x	Potentially from Bechtel National, Inc.
Aerial photographs (historical)		x	Potentially from Bechtel National, Inc.
Utility Layouts:			
Water		x	Local utility company
Sewer Lines		x	Local utility company
Gas Lines		x	Local utility company
Electric Lines		x	Local utility company
Telephone Lines		x	Local utility company
Cable Lines		x	Local utility company
Above-ground Storage Tanks		x	Local utility company
Underground Storage Tanks		x	Local utility company
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Property owner
Loading & Foundation Design Dwgs.		x	Property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		
Organic Compounds	x		
Metals	x		
PCBs	x		
Pesticides	x		
Sampling for Constituents of Concern in Groundwater:			
Radionuclides	x		
Organic Compounds	x		
Metals	x		
PCBs	x		
Pesticides	x		
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water	x		
Water table fluctuations	x		
Direction of groundwater flow	x		
Radiological Investigation:			
Radon Testing	x		outdoor flux measurements
Exposure Rate or Surface Scan	x		
Downhole Gamma Logging	x		

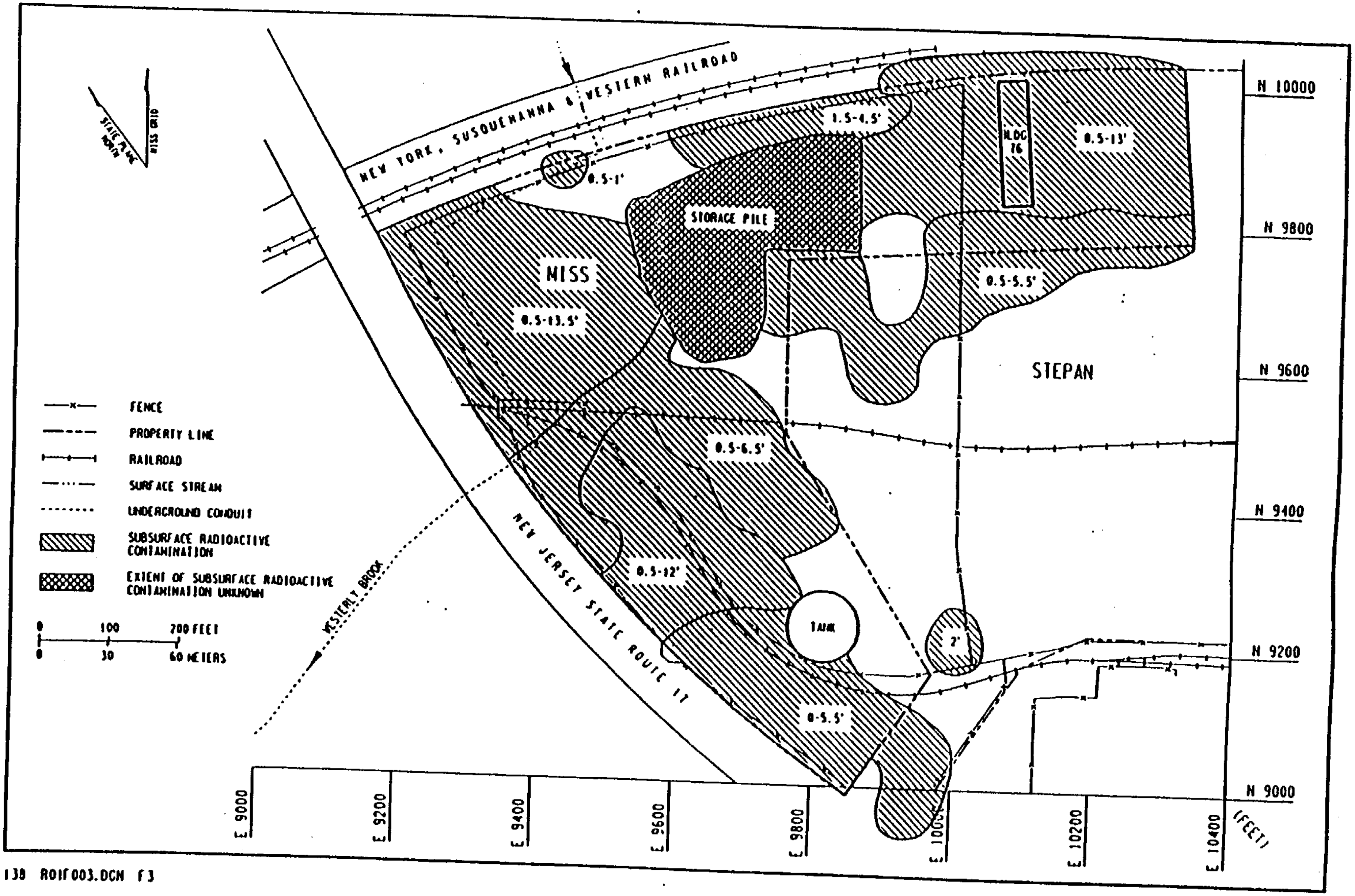


Figure 1-10
MISS Areas and Depths of Radioactive Contamination

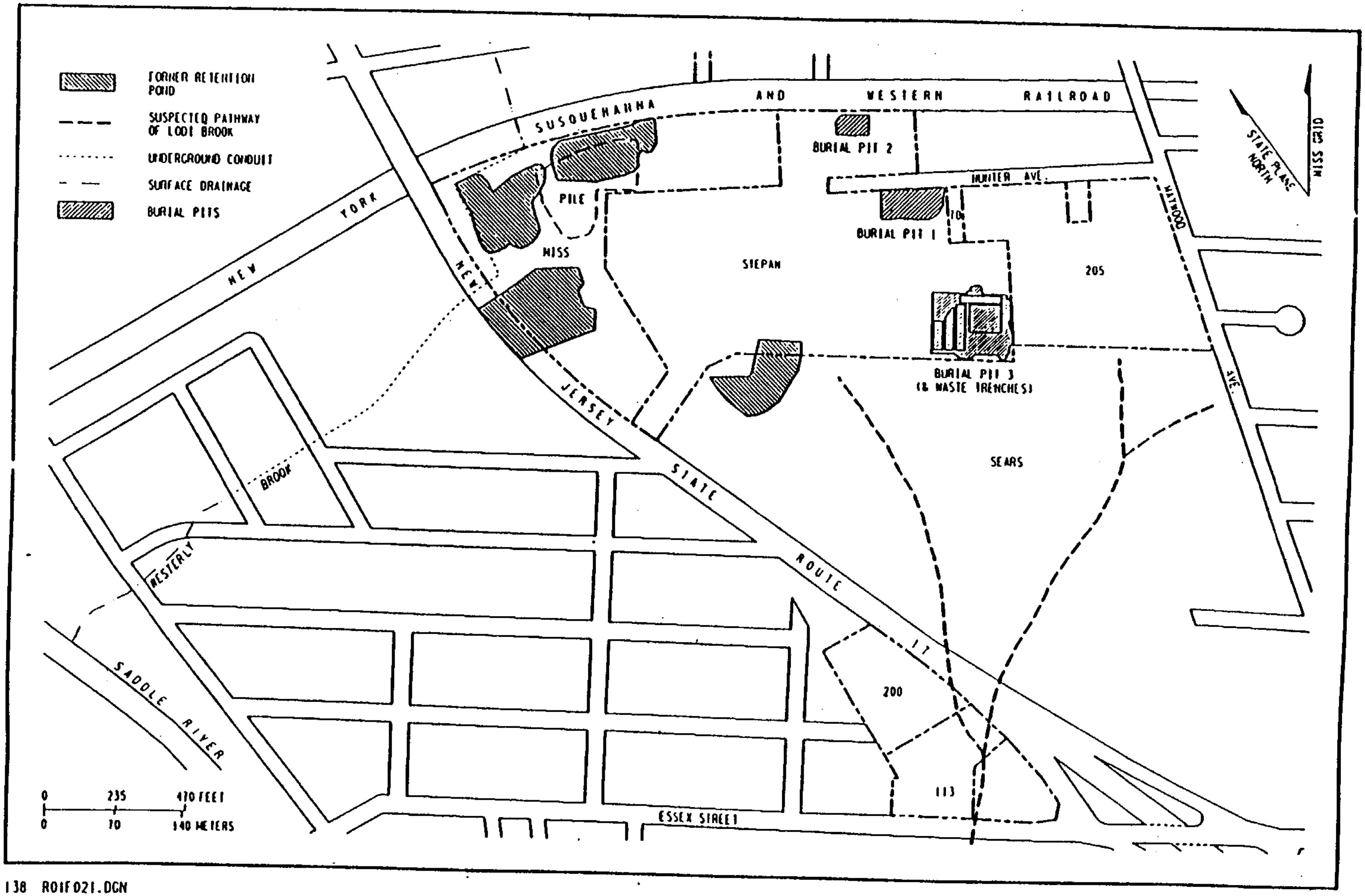
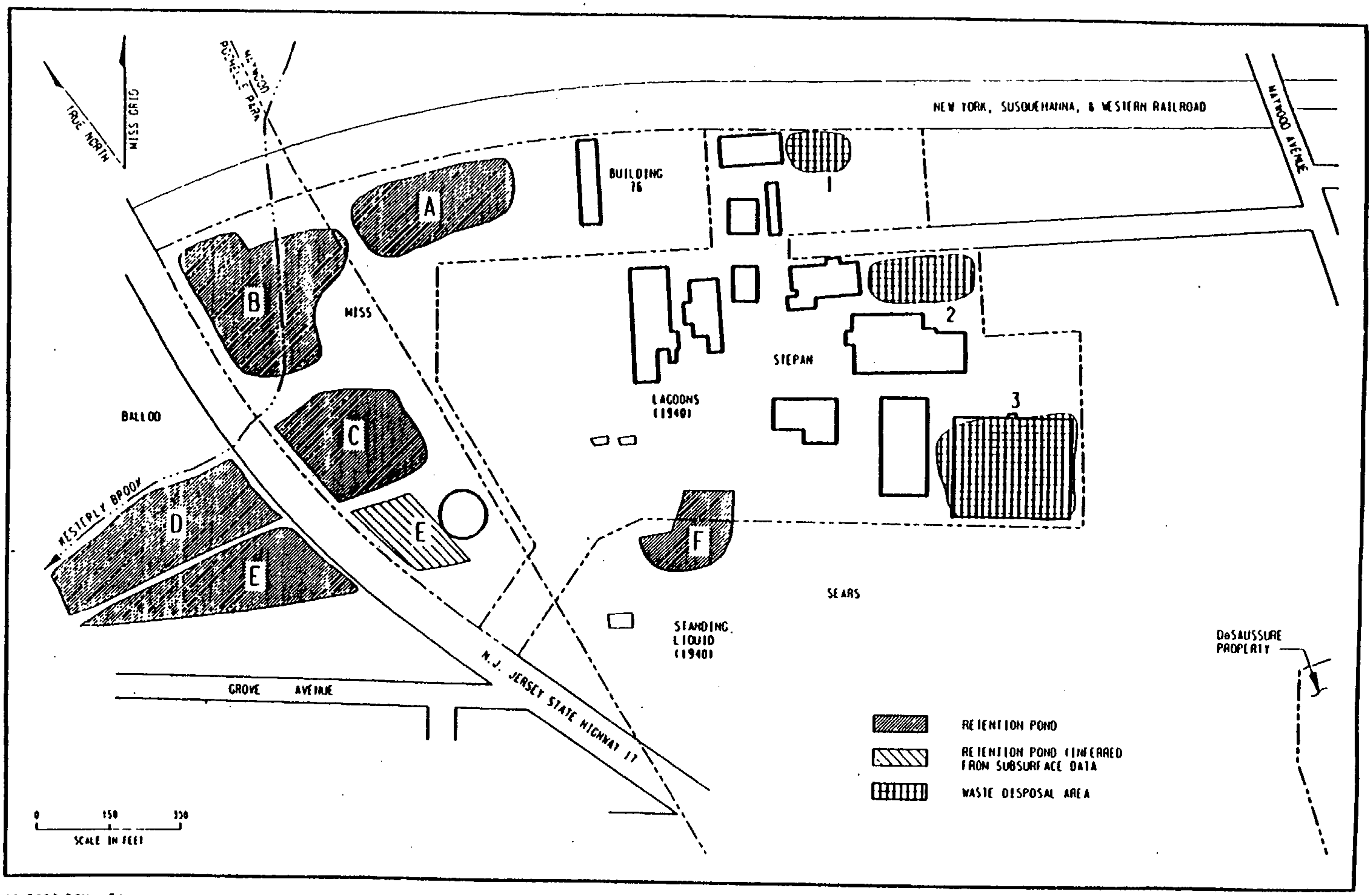
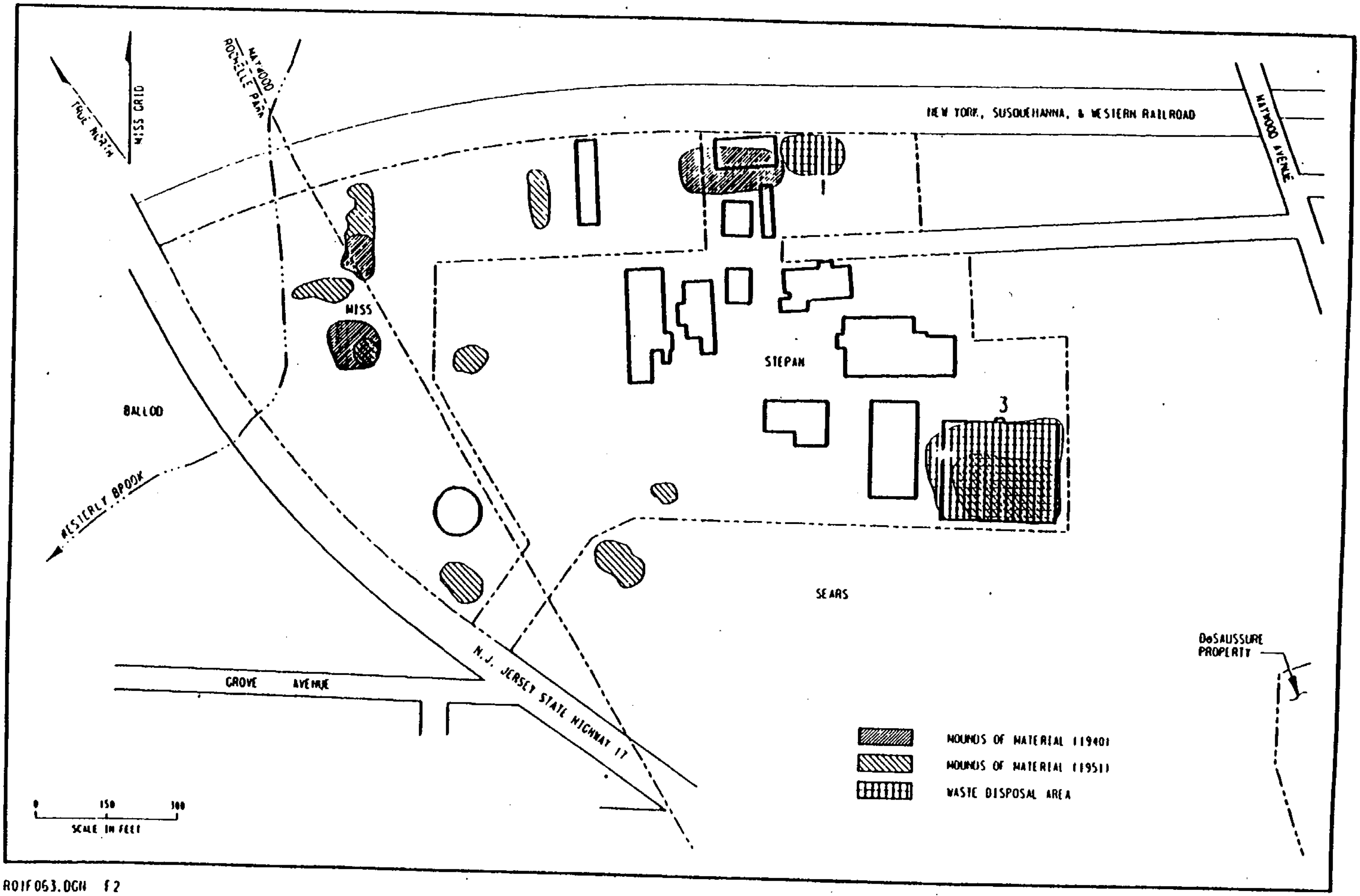


Figure 4-9
Locations of Primary Sources of Contamination



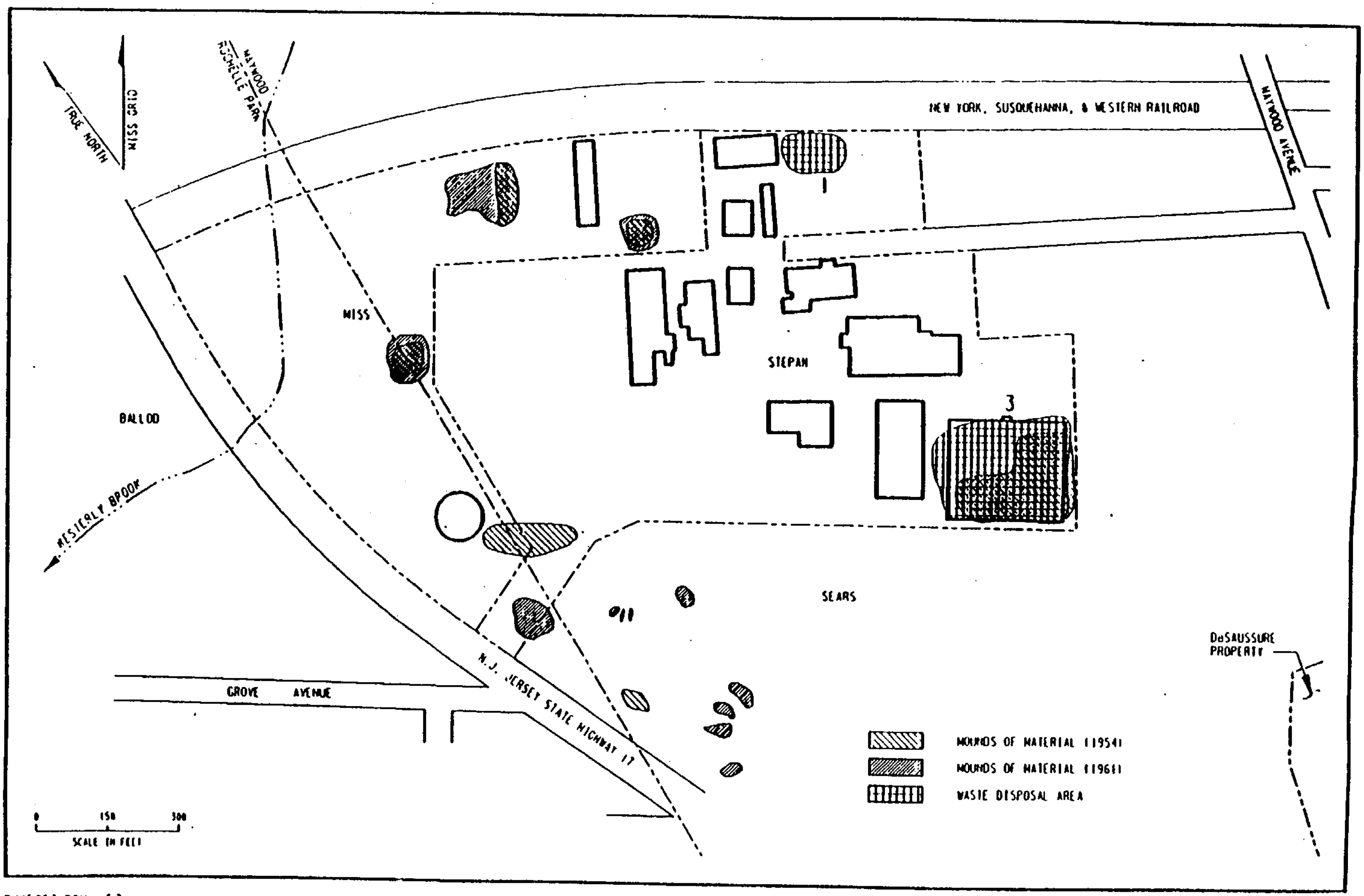
R01F063.DGN F1

Figure 4-10
Approximate Locations of Retention Ponds (1940-1983)



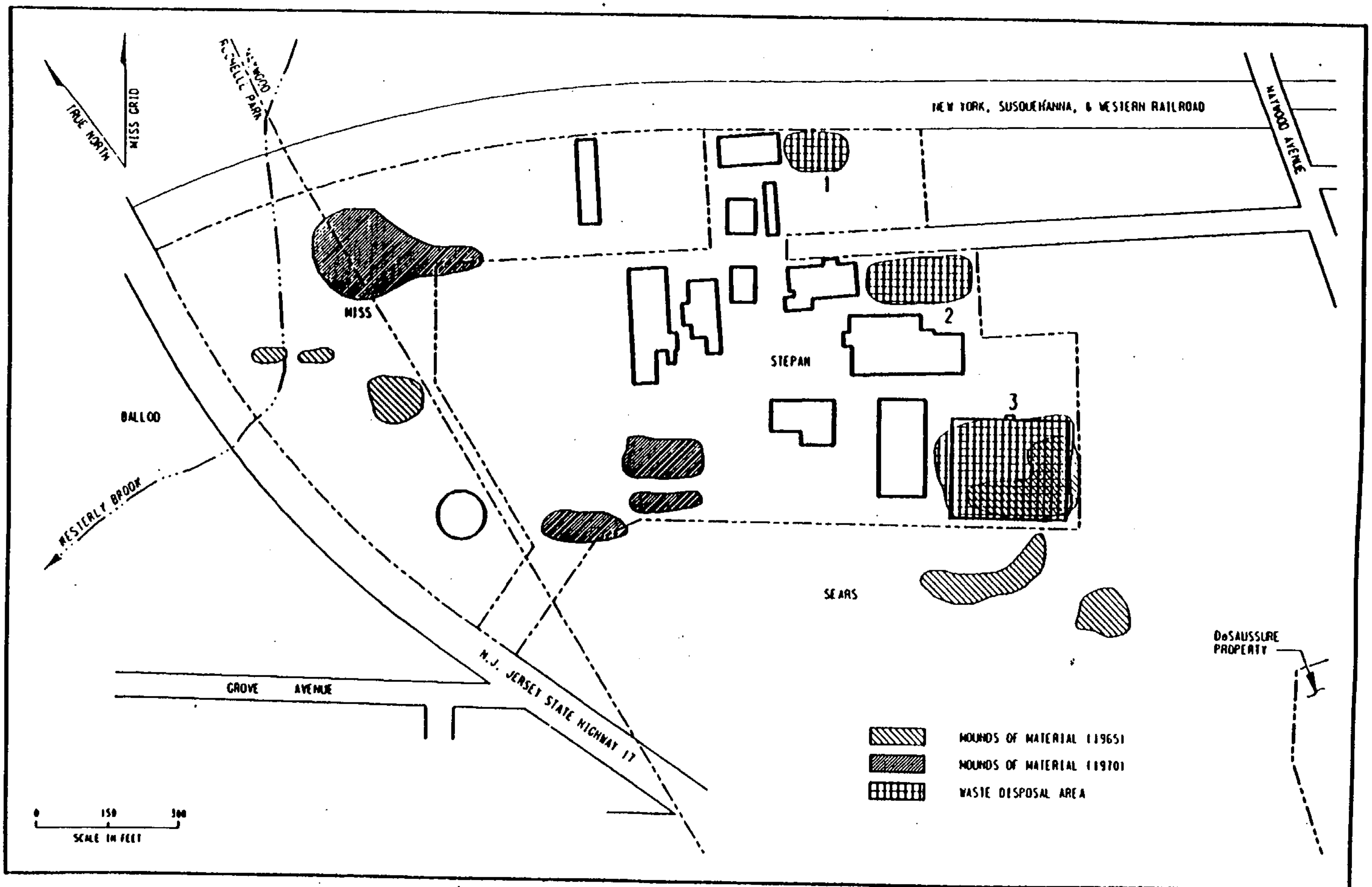
R01F063.DGN F2

Figure 4-11
Approximate Locations of Mounds of Material (1940-1951)



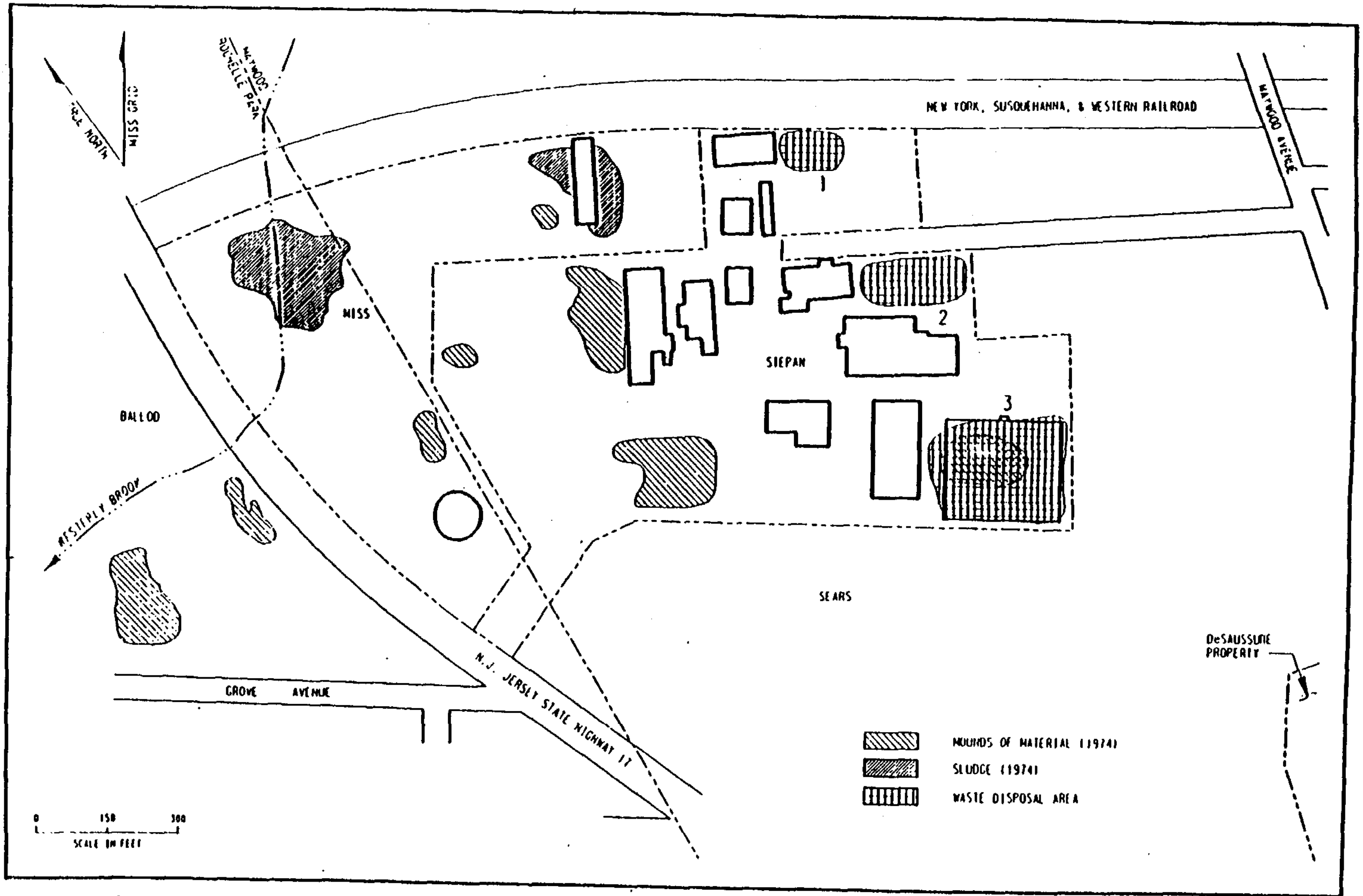
RUIF063.DGN F3

Figure 4-12
Approximate Locations of Mounds of Material (1954-1961)



R01F063.DGN F4

Figure 4-13
Approximate Locations of Mounds of Material (1965-1970)



R01F063.DGN F5

Figure 4-14
Approximate Locations of Mounds of Material and Sludge (1974)

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

NEW YORK, SUSQUEHANNA AND WESTERN (NYS&W) RAILROAD

A. Description of Property

The New York, Susquehanna and Western (NYS&W) Railroad site is approximately 2,800 feet long and 100 feet wide. This portion of the railroad forms the northern boundary for the Ballod Associates Property (formerly part of Maywood Chemical Works property), the MISS, and the Stepan Company property. Two sets of railroad tracks on the NYS&W railroad were in daily use in November, 1983 according to a report by Bechtel National, Inc. (M-097). It is not known whether this portion of the railroad tracks is currently used.

The NYS&W Railroad was built in 1872 to connect the Hudson River to the Pennsylvania coal fields. There are approximately 2,900 cubic yards of accessible contaminated soils, and 3,100 cubic yards of inaccessible contaminated soils (soil directly under railroad tracks considered inaccessible) at the site.

B. Site-Specific Geology

No boring have been performed at this site.

C. Site Specific Geophysical

No geophysical information was located for this property.

D. Site-Specific Geotechnical

No geotechnical laboratory data was located for this property.

E. Site-Specific Hydrogeology

No hydrogeological data was located for this property.

F. Civil/Survey Information

No Civil/Survey information was located for this property.

G. Underground Utilities

No utility information was located for this property.

H. Previous Investigations (Radiological)

Document M-113 was indexed as a report related to the railroad property. It may be the BNI radiological survey report covering exposure rate, soil sampling, and downhole gamma logging activities. Unfortunately, M-113 was not available for review.

I. Previous Investigations (Environmental)

No environmental investigation information was available for this property.

J. Summarize Data Gaps

Historical - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geological Data - No site-specific geological data is available. Geologic data is required to quantify volumes of fill/soil to be acquired for the remediation design.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, train tracks or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, train tracks or other structures to be protected will also be required.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements are outlined in the Groundwater Investigation Workplan.

No radiological characterization data have been reviewed for this property.

References

M-097, Survey Plan for the Radiological Characterization of the Vicinity Properties of the Stepan Chemical Plant, Bechtel National, Inc., November, 1983.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: New York, Susquehanna, and Western Railroad Property

Property Address: NA

County/State: Bergen County, New Jersey

Property Use:

Company Name: New York, Susquehanna, and Western Railroad

Company Contact Name : Nadine Steckler

Company Contact Address/Phone No.: (607) 547-2555, x 201

Current Property Use: Unknown

Hours of Operation: NA

Past Uses: Railroad

Property Description:

Lot Size: Approx. 2,800 feet long and 100 feet wide

No. of Buildings : None

Building(s) size (each): None

Year built: Approximately 1872

Zoning: Commercial/Industrial

Uses of Adjacent Properties:

North: Residential
East: Continuation of railroad tracks

South: Bordered to the south by MISS and Stepan Chemical Company
West: Continuation of railroad tracks

Nearest structure on adjacent properties and each side of site boundary:
New Jersey State Route 17 runs over the railroad. Building 76 on the MISS property is adjacent to the southern boundary of the railroad. Building 78 on the Stepan property is adjacent to the southern boundary of the railroad.

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? Unknown

Type of equipment: ______
Equipment ID No.: ______
Installation Date: ______
Labels: ______
Fluid volume: ______

Is there any secondary containment?

______

Is any of the equipment leaking or damaged? If so, describe: ______

Is there any known history of leaks or discharges?

______

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:	______	______	______
Substance Stored:	______	______	______
Installation Date:	______	______	______
Registration (Y/N)	______	______	______
Corrosion protection	______	______	______
Single or double-walled	______	______	______
Leak detection tests (Y/N)	______	______	______
Results of testing:	______	______	______

Any known history of leaks ? ______________________________

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank? ______________________________

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:

____

Were there past operations conducted on the property that required the use of USTs? If so, describe: ______________________________

Are there any USTs removed from service, but left in the ground?

____

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner).

Any history of leak or discharge from ASTs?

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Hazardous Waste Storage and Disposal

EPA Identification number for site: NA

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste

(Includes biological or medical)

Describe condition of hazardous waste containers (is there any corrosion or leakage?)

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Water and Wastewater

Are there any sanitary or septic system on the site?
NA

Note source of water for the site, and identify on-site wells
NA

Note if site falls within floodplain, describe direction of runoff.
Site does not fall within 100-year flood hazard area.

Note if any water quality data is available for on-site wells.
Unknown

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	Local Utility Company
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Local Utility Company
Underground Storage Tanks		x	Local Utility Company
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides		x	PDI Investigation
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	Groundwater Investigation
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	Borehole information only
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing		x	Not Applicable
Exposure Rate or Surface Scan		x	PDI Investigation
Downhole Gamma Logging		x	PDI Investigation

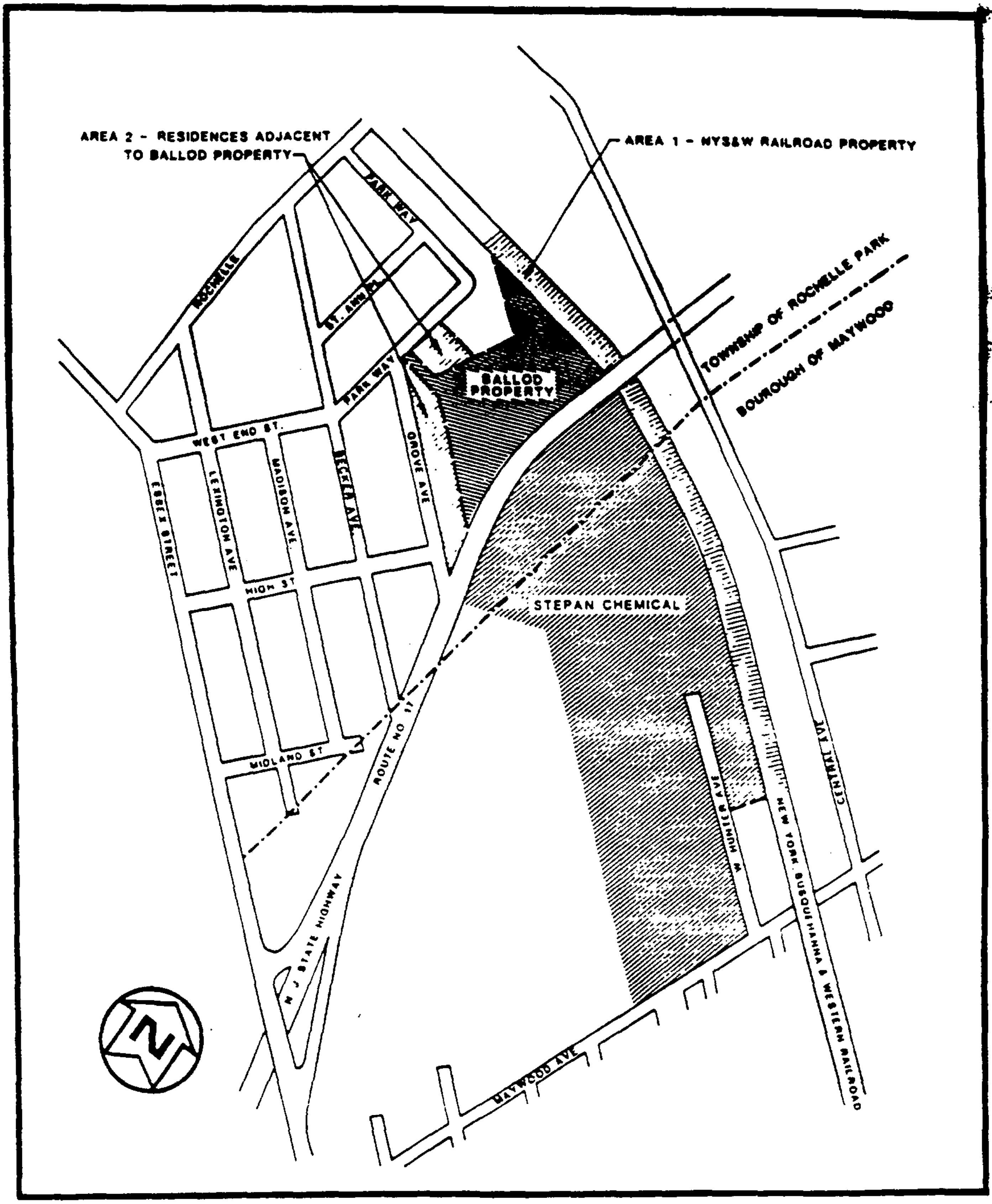


FIGURE 1 MAP OF STEPAN CHEMICAL PLANT AND VICINITY PROPERTIES

PRELIMINARY DESIGN INVESTIGATION WORK PLAN
FUSRAP MAYWOOD SUPERFUND SITE
SUMMARY FORM

NEW JERSEY RT. 17 (State Property)

A. Description of Property

The New Jersey Rt. 17 (State Property) extends approximately 1200 feet along Rt. 17 and the east and west embankments from the intersection of the New York, Susquehanna, and Western (NYS &W) Railroad and Rt.17 south to Grove Avenue. The property borders the entire western boundary of the Maywood Interim Storage Site (MISS) property and crosses the Maywood railroad spur. The Ballod Property lies to the west. New Jersey Rt. 17 was constructed in 1932 through an area formerly owned by the Maywood Chemical Works. Rt. 17 was built over two areas previously used as retention ponds to store process residues. These residues resulted from operation conducted by the Maywood Chemical Works to extract thorium from monazite sands. Based on Bechtel's investigation, radiological contamination was found in two main areas formerly used as retention ponds (Area A and B). Area A is located along Rt 17 from the NYS & W to south of the existing railroad spur on the Maywood Property. The volume of contamination estimated for Area A is 9,300 cubic yards. Area B is located along Rt. 17, south of the reservoir on the MISS. The volume of contamination estimated for Area B is 4,650 cubic yards. (M-114).

B. Site-Specific Geology

Bechtel installed 19 angled and 10 vertical boreholes along the embankments of Rt. 17 for the purpose of obtaining site-specific geology and radiological information. Angle boreholes were advanced from 30 to 79 feet below existing grade. Vertical boreholes were drilled from 3 to 6 feet below grade. Based on the information obtained during drilling of these boreholes, the characterization of the geological materials observed could be divided into 3 distinct sections (Section 1, 2, and 3) (M-114).

Section 1 (the high embankment south of the main NYS&W railroad undercrossing) had primarily sand with occassional cobbles. Cobbles were observed on the slope where the sand matrix may have been eroded, which left them exposed, however they were not observed in the actual boreholes. Sludges were observed at depth in these boreholes (M-114).

Section 2 (the intermediate section of the embankment, south of the railroad spur undercrossing) is approximately 10 to 15 feet high. Materials observed in this section included sands with some silts. The upper materials were dry, but locally described as damp to moist. Sludge materials were also observed in this section (M-114).

Section 3 (low embankment section) is approximately 1 to 3 feet high and was constructed of a dark, "sticky", silty sand with local clay zones. The upper layers of this section are gravels thought to be part of the roadbase materials. Groundwater was encountered in the angle holes drilled into the low embankment (M-114).

C. Site Specific Geophysical

No geophysical surveys were found.

D. Site-Specific Geotechnical

No site-specific geotechnical data was found.

E. Site-Specific Hydrogeology

No site-specific hydrogeological information was found.

F. Civil/Survey Information

No civil/survey information was found.

G. Underground Utilities

No underground utility information was found.

H. Previous Investigations (Radiological)

Radiological data were presented by Bechtel National, Inc. (BNI) in Radiological Survey Report for New Jersey Route 17 in Rochelle Park, New Jersey (M-114), a letter report sent to the USDOE on December 15, 1986. It describes their investigation, which consisted of outdoor exposure rate measurements with a 2" x 2" sodium iodide coneshielded gamma detector and collection of surface soil samples for thorium, radium and uranium analysis. Both vertical and angled boreholes were installed and downhole gamma count rate data were collected.

Exposure rate data were presumably collected, but not reported. Thorium-232 concentrations in surface soil samples ranged from 0.9-17.7 pCi/g; however, based on gamma count measurement data, BNI estimated that surface thorium concentrations were as high as 90 pCi/g on the site.

The subsurface investigation consisted of collecting gamma logging data in 19 angled boreholes (into the sides of the embankments on either side of Route 17) and 10 vertical boreholes. As shown in the attached figure, radiological contamination was found in several areas on both sides of the highway, which was constructed through two former retention ponds on the original Maywood Chemical Works property, as described above. The depth of contamination was estimated to range from 0.5 to 9 feet below the elevation at the toe of the embankment. Approximately 14,000 cubic yards of contaminated material were estimated to reside beneath Rt. 17 and under the embankments on either side of Rt. 17 (M-114). However, all contaminated soils on this property are inaccessible.

I. Previous Investigations (Environmental)

There is no environmental investigation information for this property.

J. Summarize Data Gaps

Historical - Information is lacking or uncertain for current property ownership, past and present uses, and site conditions.

Geologic Data - Available data is sufficient to geologically characterize site soils for purposes of fill/soil acquisition for the design study.

Geophysical Data - There is a data gap for site geophysical data. Additional data must be collected in order to fully characterize underground utilities/structures that may impact intrusive activities.

Hydrogeological Data - No site-specific hydrogeological data is available. Hydrogeological data is required to estimate depth to water, seasonal water level fluctuations, and direction of groundwater flow.

Geotechnical Data - Geotechnical data gaps for design include additional subsurface information on soils and bedrock, particularly at depths below the proposed excavation depths. This information will be needed to design excavation support systems where excavations will be conducted adjacent to buildings, roads, or other structures, or where there is not sufficient room on site to safely slope and bench excavations. Subsurface information will also be required to perform required geotechnical analyses, such as stability and settlement.

Other design data gaps include laboratory data to determine design parameters for soil and possibly bedrock, such as strength and consolidation parameters. Additional hydrogeological information may be required if dewatering will be performed. Foundation information for existing buildings, roads, or other structures to be protected will also be required.

Civil/Survey Data - No detailed site basemaps, topographic information, or property boundary maps are available.

Underground Utility Data - No detailed maps showing locations of underground utilities are available.

Environmental Data - No chemical data exists to chemically characterize site soils or groundwater. Chemical data must be collected to characterize site soils and groundwater. Groundwater sampling requirements will be outlined in the Groundwater Investigation Workplan.

Radiological - The BNI downhole gamma logging data identify the areas that contain materials with radionuclide concentrations that may exceed the commercial use criteria. However, supplemental data are needed to better define the vertical extent of contamination within the embankments. Since contaminated residues exist at depths greater than a few feet, borehole installation/downhole gamma spectroscopy measurements will be necessary to achieve that goal.

References

(M-114), Radiological Characterization Report for N.J. Route 17 in Rochelle Park, New Jersey, Bechtel National, Inc., December, 1986.

PRELIMINARY DESIGN INVESTIGATION WORKPLAN
FUSRAP MAYWOOD SUPERFUND SITE
INFORMATION CHECK-LIST

I. PROPERTY BACKGROUND INFORMATION

Property Identification

Property Name: New Jersey Rt. 17 (State property)

Property Address: Along the western boundary of the Maywood Site

County/State: Rochelle Park, New Jersey

Property Use:

Company Name: NJDOT

Company Contact Name : Scott Sheldon

Company Contact Address/Phone No.: (973) 770-5138

Current Property Use: State Highway (Rt. 17), vehicle traffic

Hours of Operation: 24 hours/day

Past Uses: State Highway

Property Description:

Lot Size: Approx. 1200 feet long.

No. of Buildings : NA

Building(s) size (each): NA

Year built: Route 17 constructed in 1932

Zoning: Commercial

Uses of Adjacent Properties:

North: New York, Susquehanna, and Wesern (NYS&W) Railroad
East: MISS

South: Grove Avenue
West: Ballod Property

Nearest structure on adjacent properties and each side of site boundary:
North (railroad); South (Grove Avenue residential and commercial properties); East (MISS property and building); West (Ballod Property)

II. SITE INFORMATION

Polychlorinated Biphenyls (PCBs)

Are there any transformers or capacitors located on the property? NA

Type of equipment:
Equipment ID No.:
Installation Date:
Labels:
Fluid volume:

Is there any secondary containment?
NA

Is any of the equipment leaking or damaged? If so, describe:
NA

Is there any known history of leaks or discharges?
NA

Underground Storage Tanks (USTs)

Are there any known USTs located on the property? Unknown

	Tank 1	Tank 2	Tank 3
Tank capacity:			
Substance Stored:			
Installation Date:			
Registration (Y/N)			
Corrosion protection			
Single or double-walled			
Leak detection tests (Y/N)			
Results of testing:			

Any known history of leaks ?
Unknown

Is there any visible evidence (stained soils, stressed vegetation) in the vicinity of the tank?
Unknown

If the presence of USTs is unknown, complete the following:

Are there current operations on the property that require the use of USTs? If so, describe:
Unknown

Were there past operations conducted on the property that required the use of USTs? If so, describe:
Unknown

Are there any USTs removed from service, but left in the ground?
Unknown

Aboveground Storage Tanks (ASTs)

Are there any ASTs on the property? Unknown

Do ASTs have secondary containment? If so, describe type & material (e.g., concrete, clay or membrane liner). Unknown

Any history of leak or discharge from ASTs?
Unknown

Hazardous Materials Handling

Are there any chemicals handled on site? If so, list the chemicals and approximate quantities: Unknown

Describe condition of containers (is there any corrosion or leakage?)
Unknown

Describe storage area for chemicals (are chemicals stored in a secured, segregated area away from drains and other water supplies?)
Unknown

Hazardous Waste Storage and Disposal

EPA Identification number for site: NA

Hazardous waste stored or generated on site	Quantities:	Disposition of Haz. Waste

(Includes biological or medical)

Describe condition of hazardous waste containers (is there any corrosion or leakage?)

Describe storage area for hazardous wastes (are chemicals stored in a secured, segregated area away from drains and other water supplies?)

Water and Wastewater

Are there any sanitary or septic system on the site?
NA

Note source of water for the site, and identify on-site wells
NA

Note if site falls within floodplain, describe direction of runoff.
Unknown

Note if any water quality data is available for on-site wells.
NA

III. INFORMATION REQUIRED TO SUPPORT REMEDIAL DESIGN

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	**No**	**If no, then describe how to obtain**
Area Maps			
FEMA Maps (floodplain delineation)		x	FEMA
USGS maps		x	Contact USGS
State wetland maps		x	NJDEP
Federal wetland map		x	EPA
Sanborn historical maps		x	Environmental Data Resources, Inc.
Site Plans:			
Base map		x	PDI Investigation
Survey drawing including topography		x	PDI Investigation
Aerial photographs (historical)		x	PDI Investigation
Utility Layouts:			
Water		x	Local Utility Company
Sewer Lines		x	County
Gas Lines		x	Local Utility Company
Electric Lines		x	Local Utility Company
Telephone Lines		x	Local Utility Company
Cable Lines		x	Local Utility Company
Above-ground Storage Tanks		x	Potentially from property owner
Underground Storage Tanks		x	Potentially from property owner
Building structural drawings		x	Potentially from property owner
Foundation drawings		x	Potentially from property owner
Loading & Foundation Design Dwgs.		x	Potentially from property owner
Previous Investigations			
Sampling for Constituents of Concern in Soils			
Radionuclides	x		Additional during PDI Investigation
Organic Compounds		x	PDI Investigation
Metals		x	PDI Investigation
PCBs		x	PDI Investigation
Pesticides		x	PDI Investigation
Sampling for Constituents of Concern in Groundwater:			
Radionuclides		x	Groundwater Investigation
Organic Compounds		x	Groundwater Investigation
Metals		x	Groundwater Investigation
PCBs		x	Groundwater Investigation
Pesticides		x	Groundwater Investigation
Geophysical Investigations			
GPR Surveys		x	PDI Investigation
Magnetometer Surveys		x	PDI Investigation

DOCUMENT	DOCUMENT CURRENTLY AVAILABLE?		
	Yes	No	If no, then describe how to obtain
Soil Parameters:			
Grain size distribution (sieve and hydrometer analyses)		x	PDI Investigation
Constituent concentration as a function of particle size		x	PDI Investigation
Organic content		x	PDI Investigation
Moisture content		x	PDI Investigation
Soil classification		x	PDI Investigation
Geotechnical Parameters:			
Atterberg Limits		x	PDI Investigation
Shear Strength		x	PDI Investigation
Soil Compaction		x	PDI Investigation
Specific Gravity		x	PDI Investigation
Consolidation		x	PDI Investigation
Hydrogeologic Investigation:			
Depth to Water		x	Groundwater Investigation
Water table fluctuations		x	Groundwater Investigation
Direction of groundwater flow		x	Groundwater Investigation
Radiological Investigation:			
Radon Testing			Not Applicable
Exposure Rate or Surface Scan		x	PDI Investigation
Downhole Gamma Logging	x		Additional during PDI Investigation

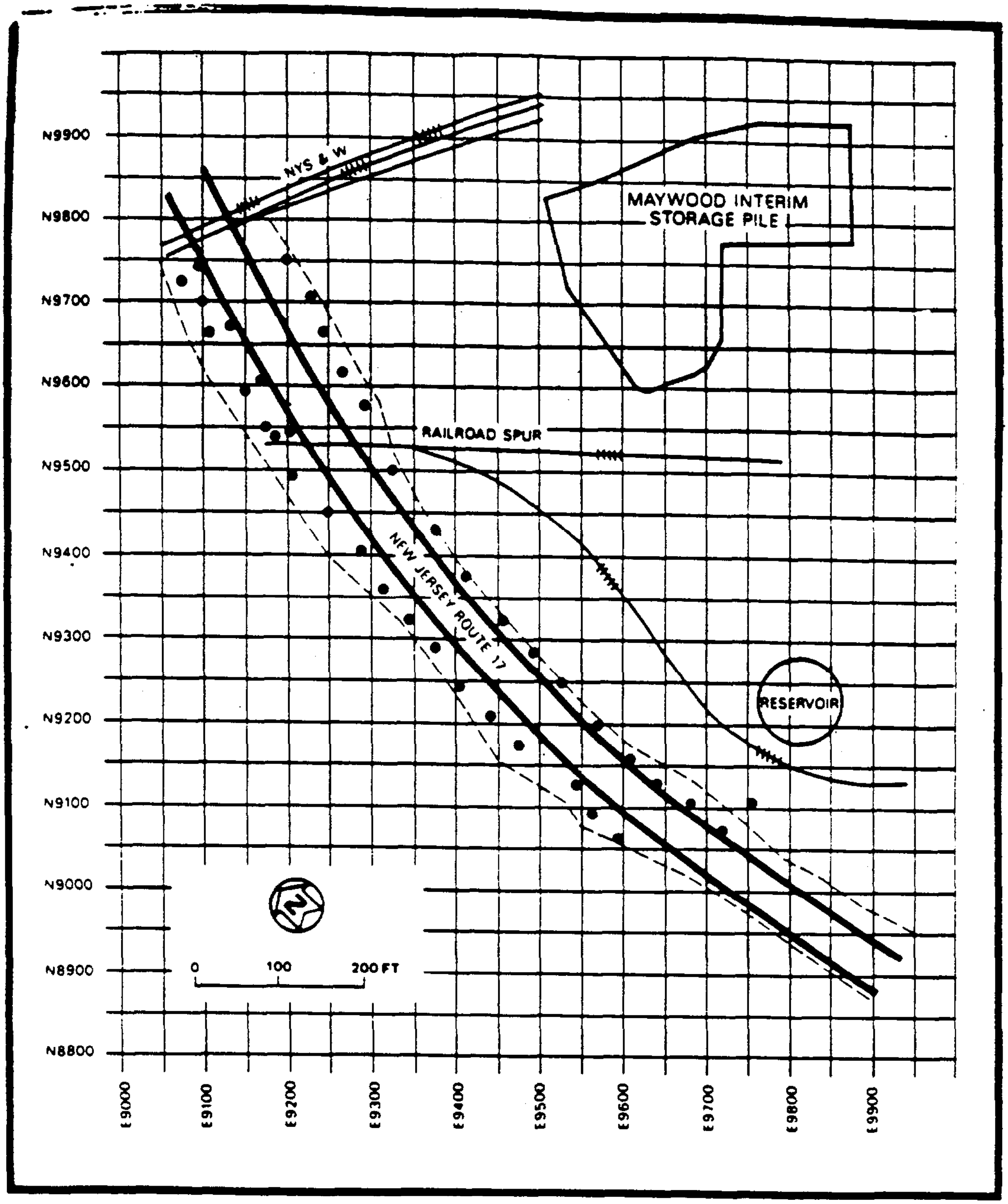


FIGURE 3 SURFACE SOIL SAMPLE LOCATIONS ON THE ROUTE 17 EMBANKMENTS

Source: M-114

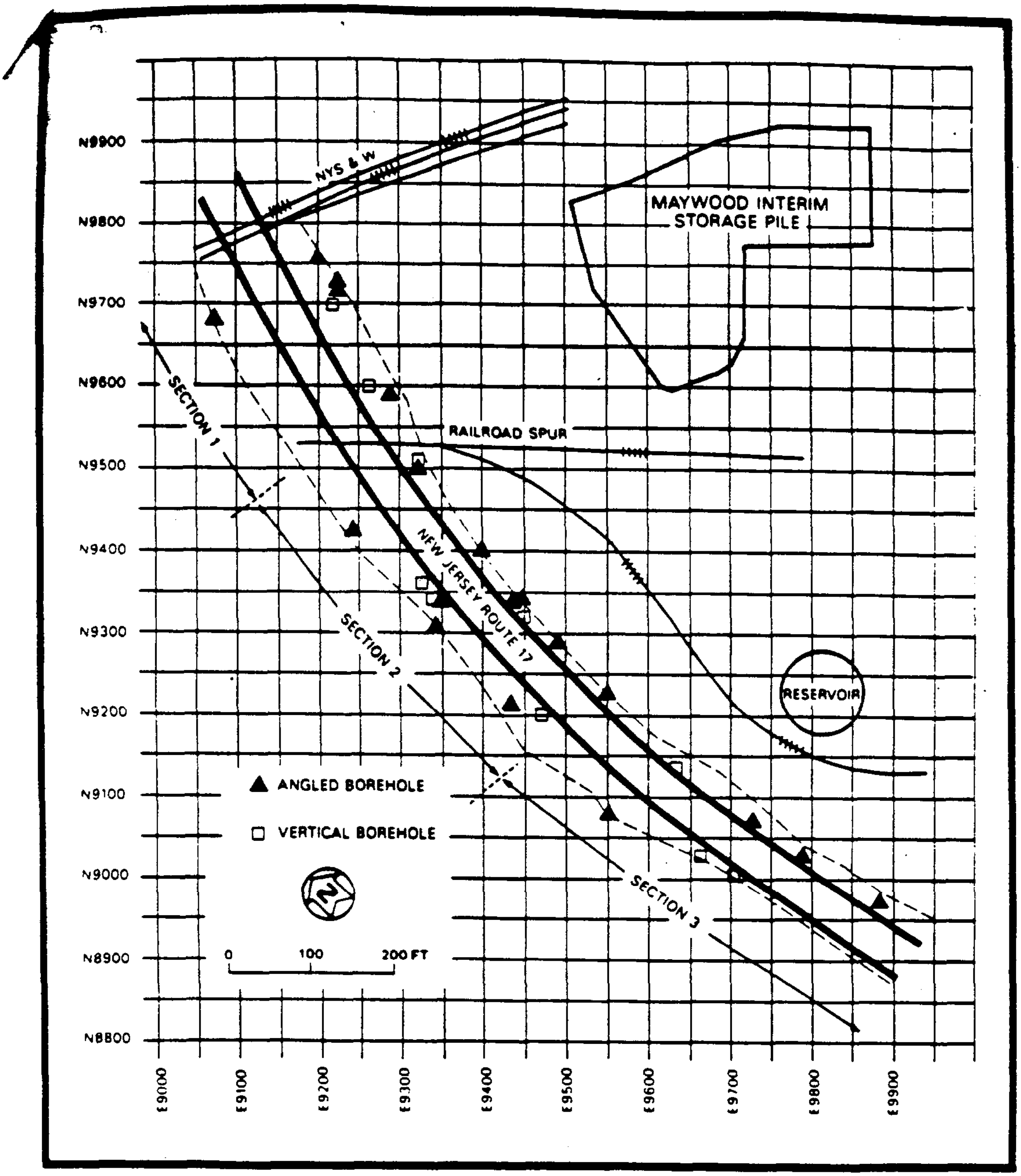


FIGURE 4 ANGLED AND VERTICAL BOREHOLE LOCATIONS ALONG ROUTE 17

Source : M114

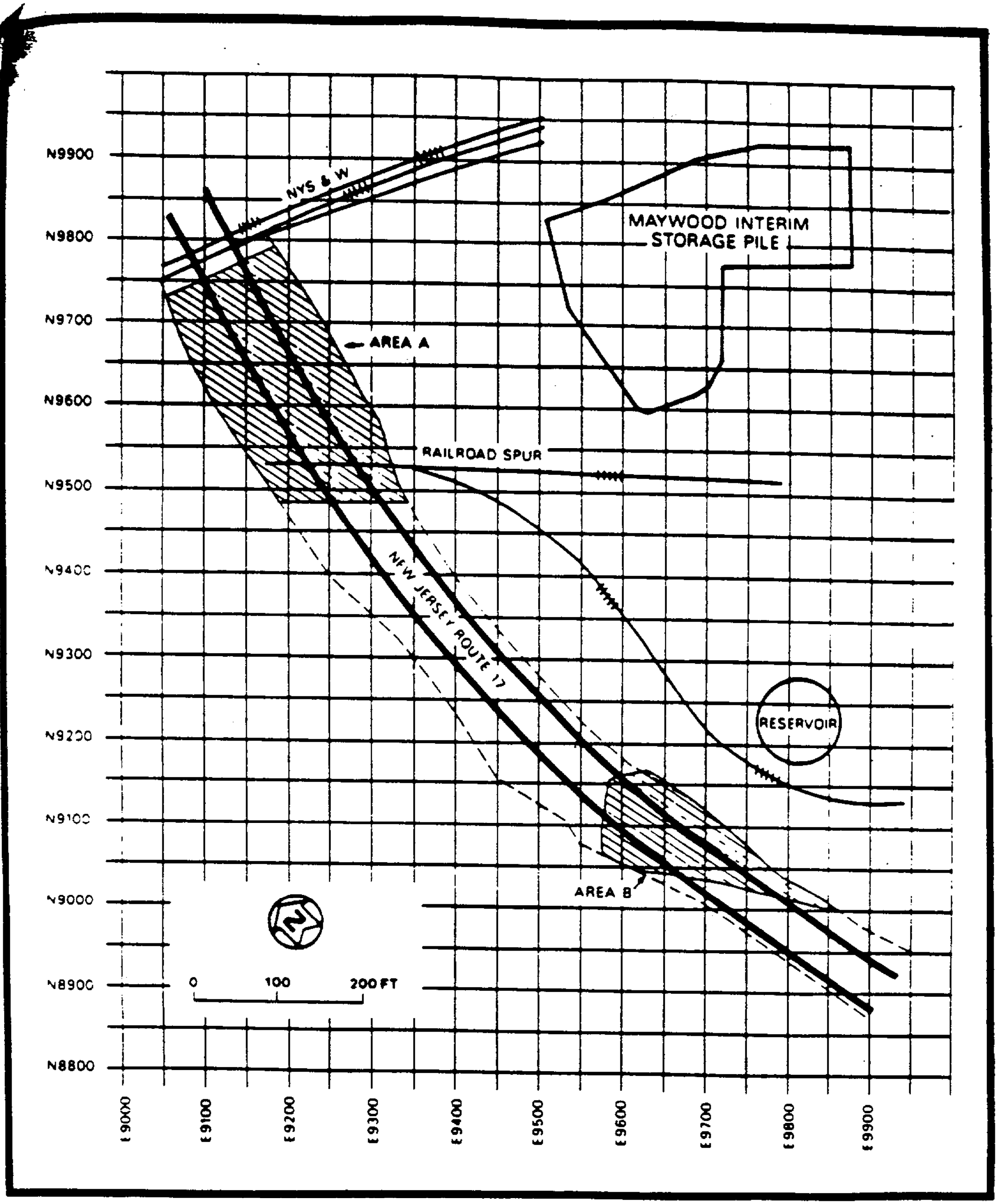


FIGURE 5 LOCATION OF FORMER RETENTION PONDS UNDER ROUTE 17

Source. M-114

VOLUME 3

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APPENDIX C – BURIED DRUMS INVESTIGATION PROGRAM

APPENDIX D – STANDARD OPERATING PROCEDURES

APPENDIX B

PHOTOGRAPH LOG

APPENDIX B
PHOTOGRAPH LOG
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Photo 1: Property Cluster No. 11 – 61 West Hunter, Entrance of parking lot looking north.

Photo 2: Property Cluster No. 11 - 50 West Hunter Avenue, View of building looking west.

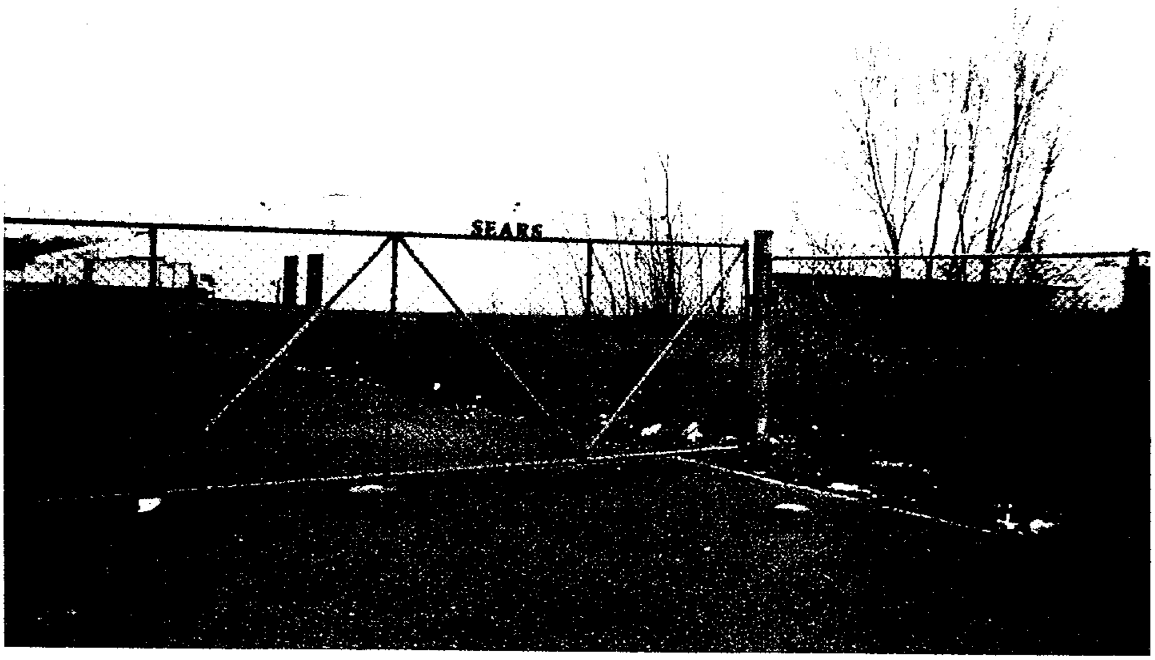

Photo 3: Property Cluster No. 9 - Sears Building looking north.

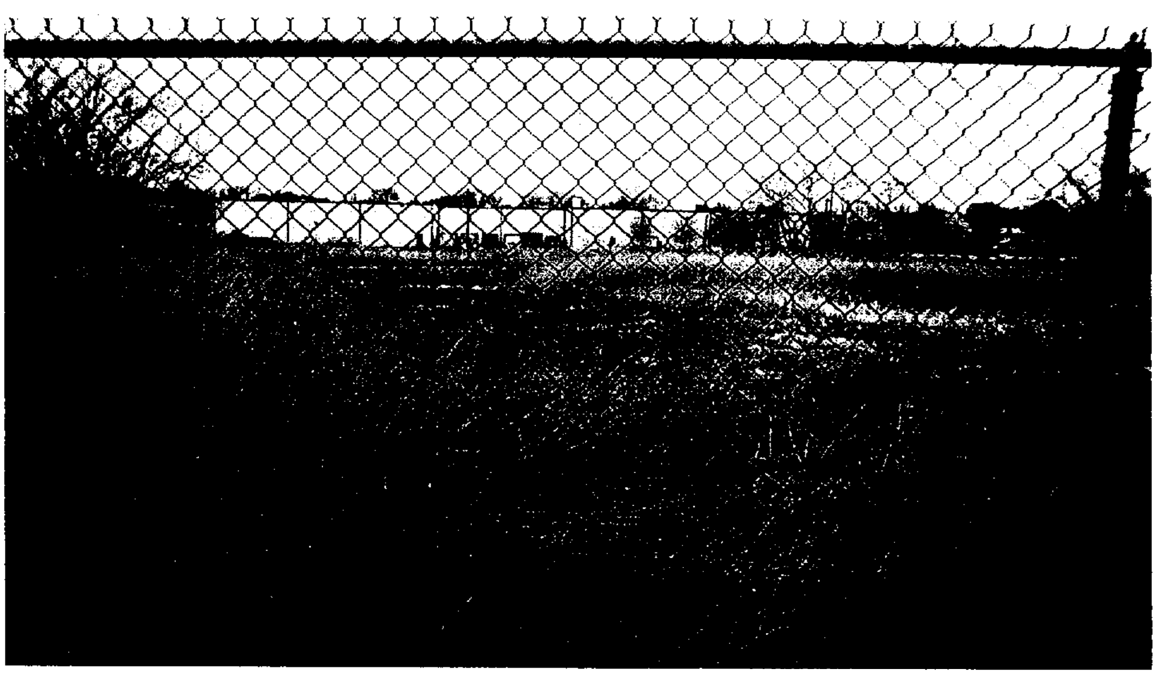

Photo 4: Property Cluster No. 9 - Sears Wetland area looking north.

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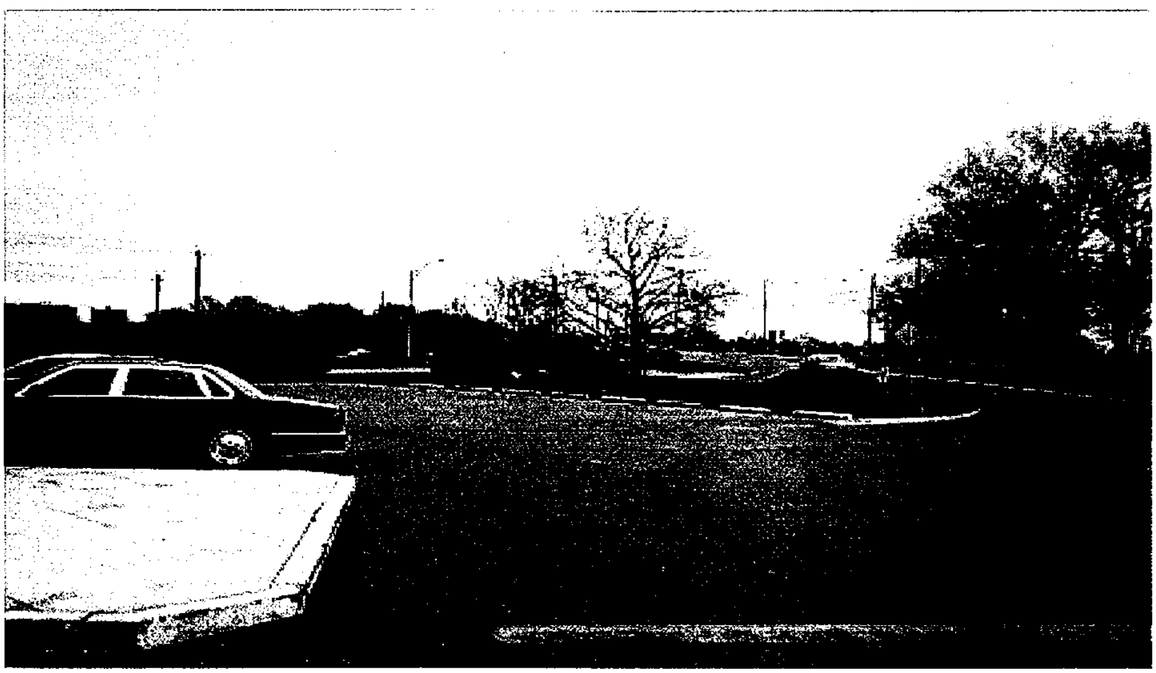


Photo 10: Property Cluster No. 5 – Muscarelle parking lot looking south at Essex St. and Route 17 South exit ramp.

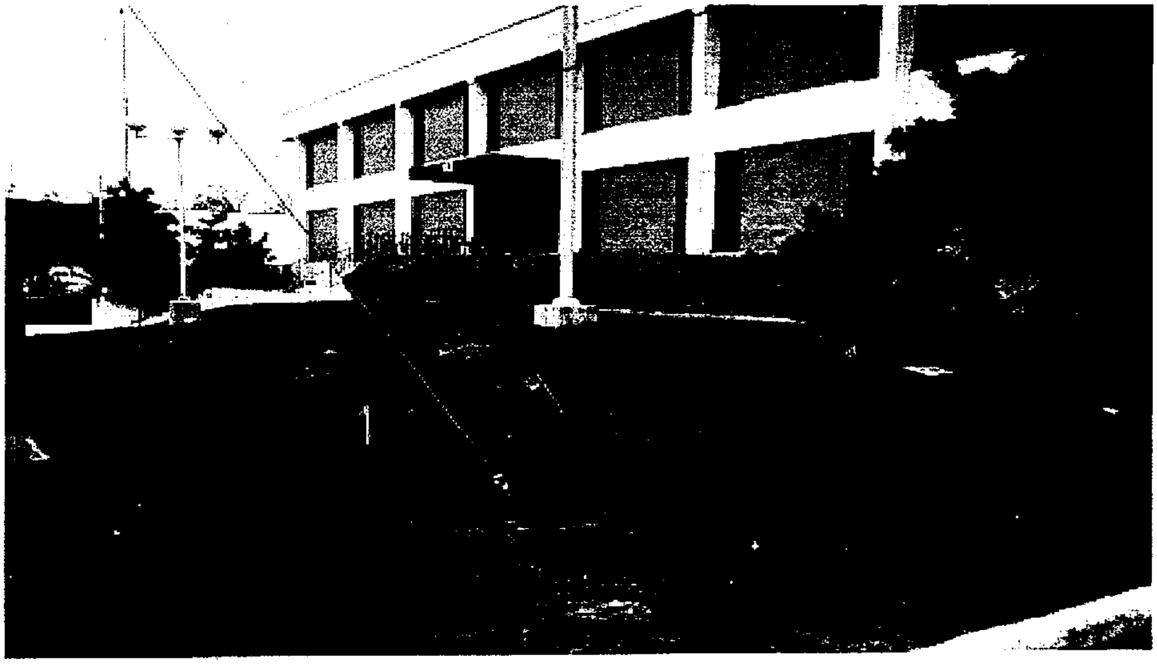


Photo 11: Property Cluster No. 5 – 113 Essex St., Grass area in front of building looking north.

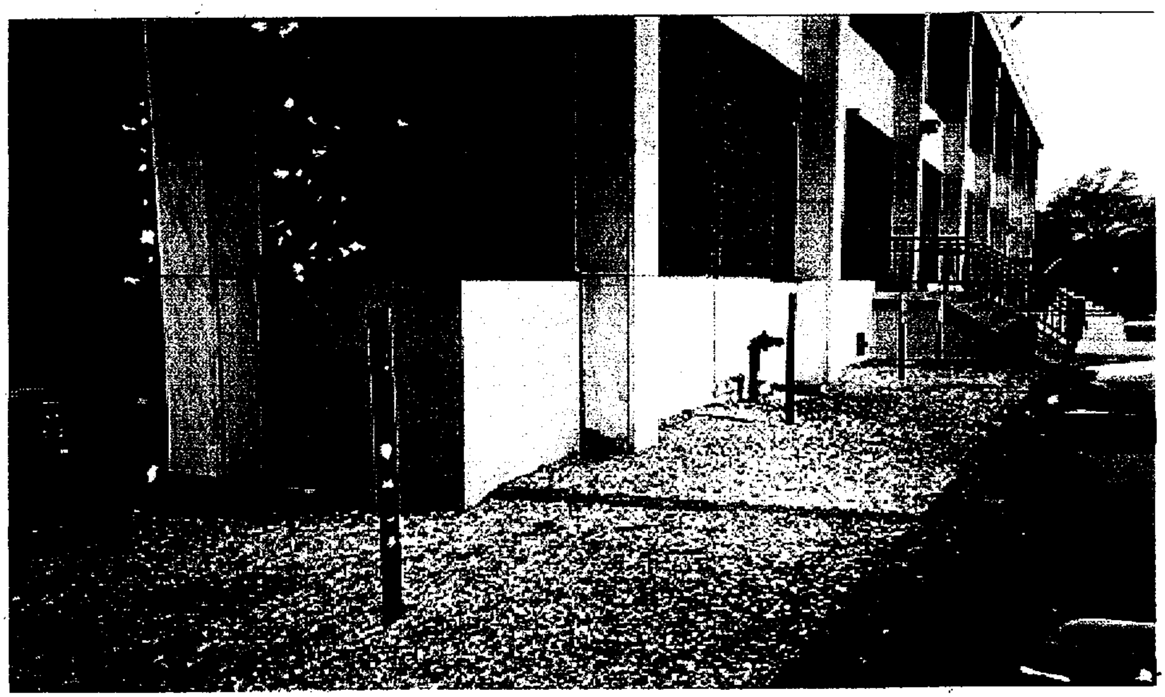
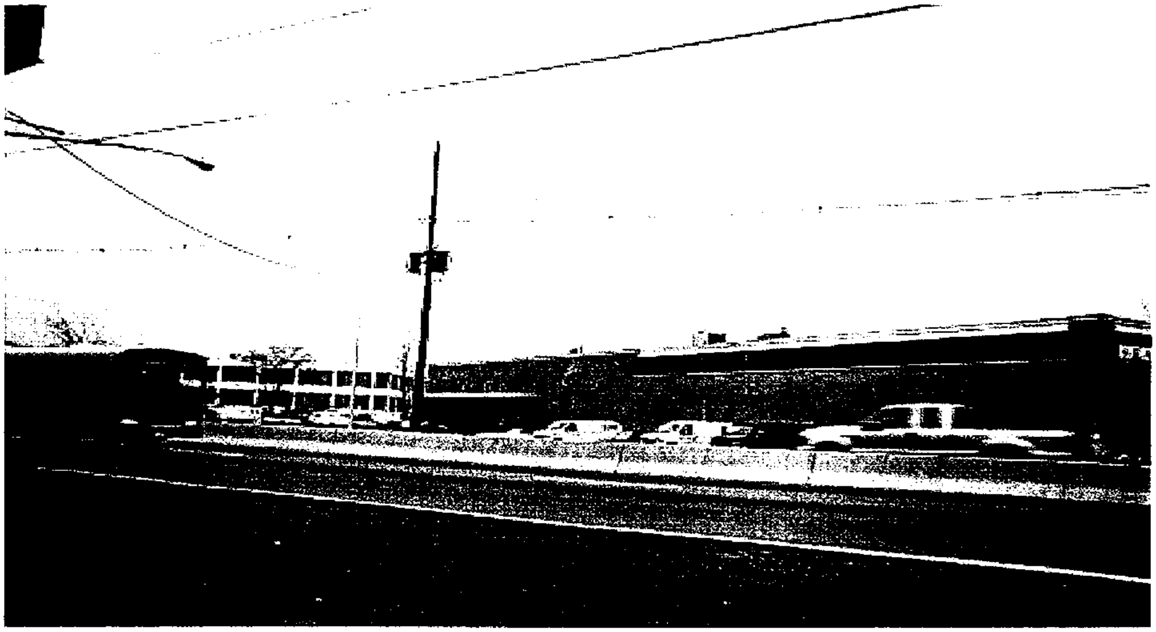


Photo 12: Property Cluster No. 5 – 113 Essex St., Gravel area on the east side of the building looking north.



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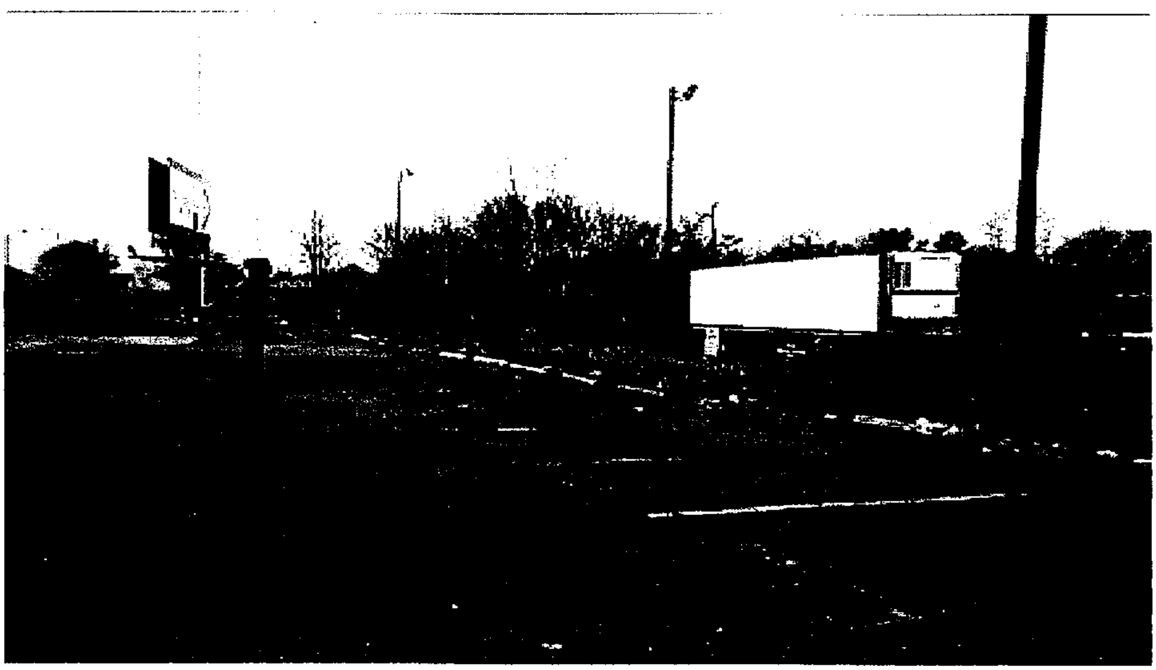

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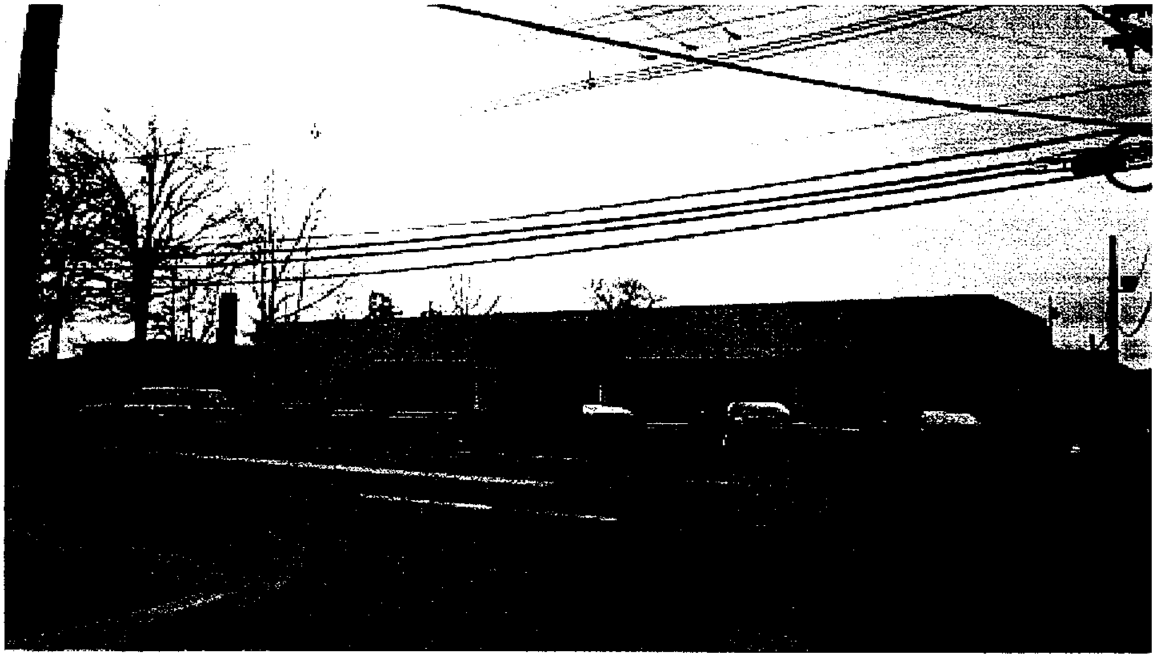

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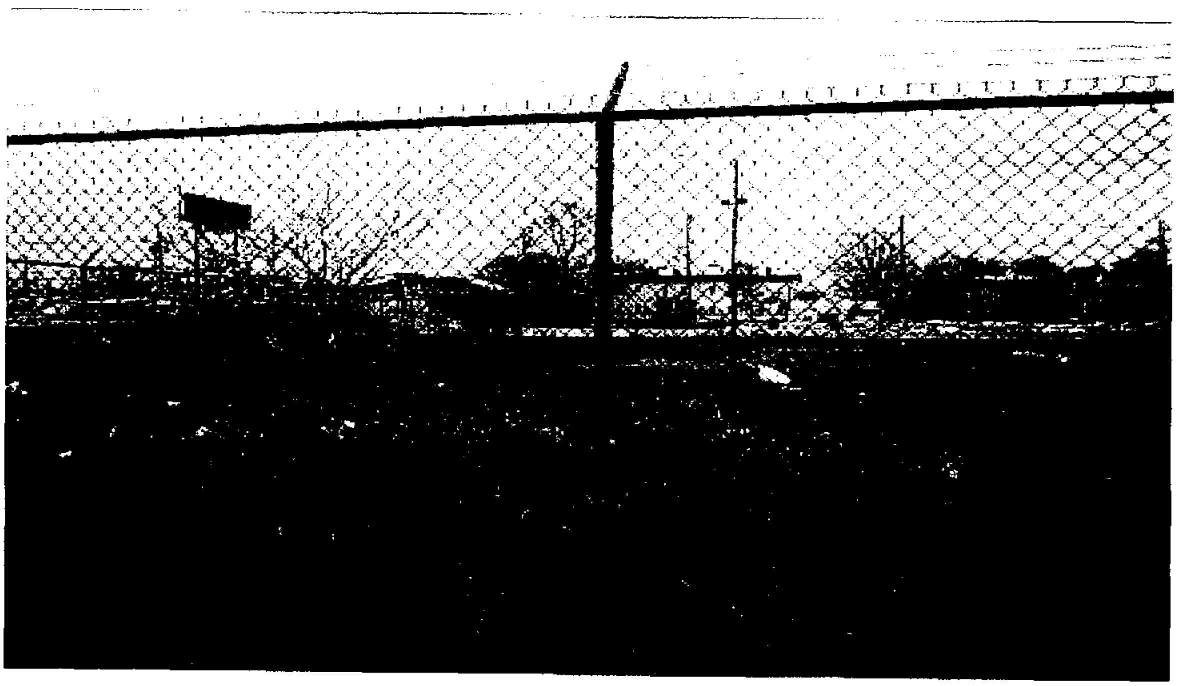

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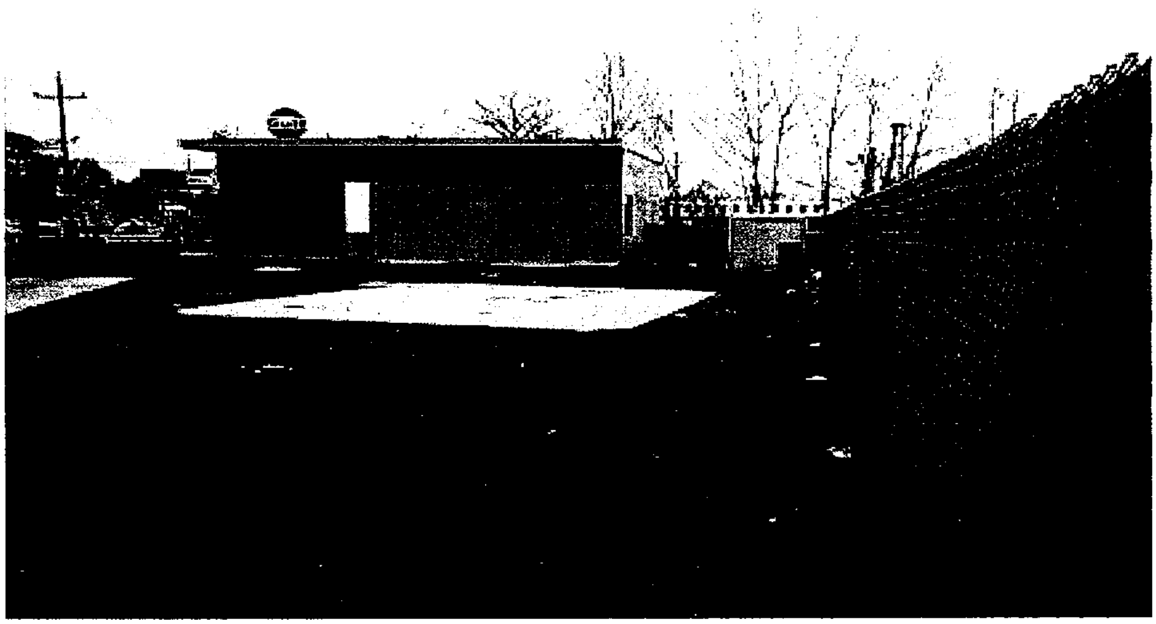

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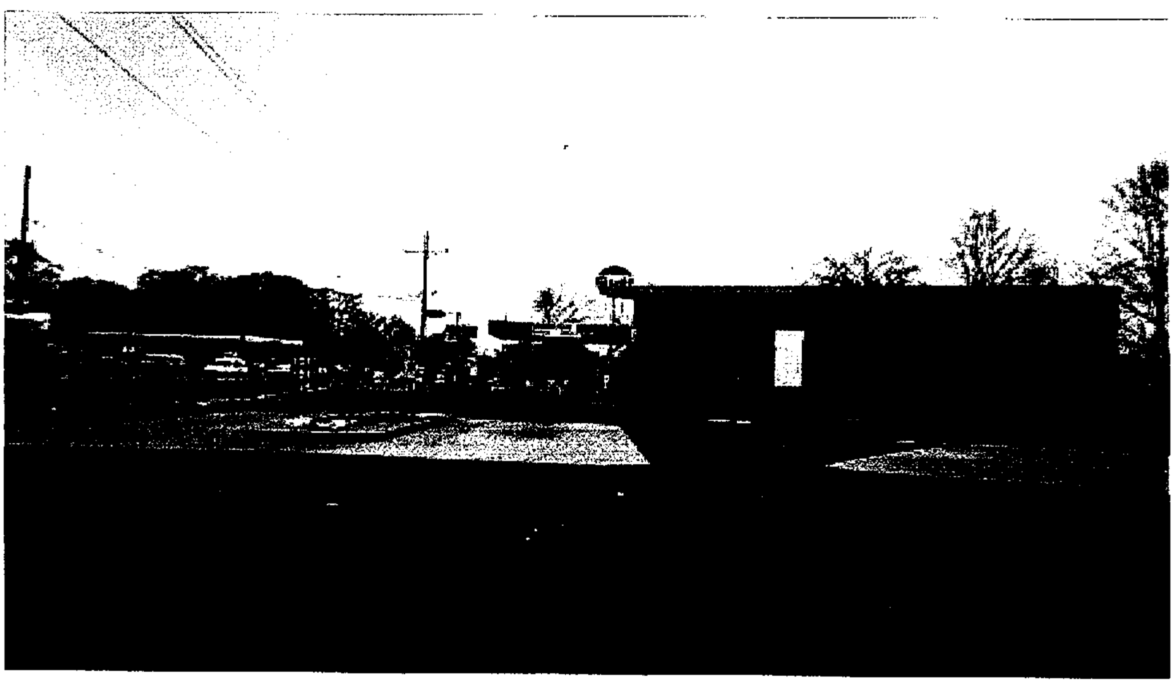

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Photo 31; Property Cluster No. 6 – 85-101 Route 17 North (Hunter Douglas, SWS Realty), View looking northeast along the eastern property boundary.

APPENDIX C

BURIED DRUM INVESTIGATION PROGRAM
(PROPERTY CLUSTER NO. 9 [SEARS])

The Sears Buried Drum Investigation Program is addressed in a work plan developed under separate cover

APPENDIX D

STANDARD OPERATING PROCEDURES
FOR THE
PRE-DESIGN INVESTIGATIONS

FUSRAP Maywood Superfund Site
Standard Operating Procedures for Pre-Design Investigation

NUMBER	TITLE
SW-MWD-102-0	Downhole Gamma Radiation Logging
SW-MWD-103-0	Routine Operations Procedure for ISOCS Measurements of Surface Soil (Currently Under Review)
SW-MWD-104-0	Routine Operations Procedure for ISOCS Measurements of Subsurface Soil (Currently Under Review)
SW-MWD-106-0	ISOCS Management Procedure (Currently Under Review)
SW-MWD-107-0	Radiation Exposure Surveys and Scans
SW-MWD-108-0	Global Positioning System (GPS) Survey
SW-MWD-109-0	Procedure for Comparative ISOCS and Soil Sample Measurements (Currently Under Review)
SW-MWD-203-0	Rock Coring
SW-MWD-301-0	Sediment Sampling
SW-MWD-302-0	Surface Water Sampling
SW-MWD-307-0	Surface and Shallow Subsurface Soil Sampling
SW-MWD-308-0	Soil Borings and Sampling
SW-MWD-313-0	Drum Handling and Sampling
SW-MWD-501-0	Conducting Field Audits
SW-MWD-503-0	Overburden Drilling Methods
SW-MWD-504-0	Labeling, Packaging, and Shipping Environmental Samples
SW-MWD-505-0	Cuttings and Fluids Management
SW-MWD-506-0	Decontamination
SW-MWD-507-0	Field Notebook Content and Control
SW-MWD-508-0	Procedure for Shipping Radiologically Contaminated Environmental Samples

Requirements for the Preparation of Sampling and Analysis Plans

Selected Tables from the QAPP and the FSP

Downhole Gamma Radiation Logging

SW-MWD-102-0

STANDARD OPERATING PROCEDURE FUSRAP MAYWOOD SUPERFUND SITE STONE & WEBSTER ENGINEERING CORPORATION		
TITLE: Downhole Gamma Radiation Logging	NO.:	SW-MWD-102-0
	PAGE	1 of 3 plus 2 pages of attachments
	DATE:	May 1999
APPROVED: Project Manager Project Engineer		

1.0 PURPOSE

The purpose of this procedure is to provide guidelines and requirements for collecting measurements of the gamma radiation count rate within a pre-drilled borehole to characterize the presence of subsurface gamma-emitting radionuclides.

2.0 SCOPE

This procedure is applicable to all personnel involved in collecting downhole gamma radiation measurements. The basic procedure described in this SOP is applicable to shallow borehole (approximately 5 feet in depth) downhole gamma logging only. Boreholes shall be inserted manually with a jackhammer or other equipment. Gross gamma count rate measurements shall be performed with a small (e.g., 3/8 x 3/8 inch) NaI detector.

3.0 REFERENCES

None

4.0 DEFINITIONS

Downhole Gamma Logging, as used in this procedure, are a series of measurements collected at six inch intervals within a pre-drilled borehole to quantify the presence of subsurface gamma ray emitting radionuclides.

5.0 RESPONSIBILITIES

5.1 Project Manager

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified to perform downhole gamma radiation logging.

5.2 Project Engineer

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for the downhole gamma radiation logging task.

5.3 Site Safety and Health Officer

All field activities must be carried out in accordance with a site-specific SSHP. The Site Safety and Health Officer is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.4 Project Superintendent

The Project Superintendent is the individual designated by the project manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed on conducting downhole gamma radiation logging in accordance with the project requirements, this SOP, and related SOPs. He or she assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin, and that all necessary personnel are mobilized on time. The Project Superintendent maintains a daily log of activities each work day.

The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected encounters during field investigations and deviations from this SOP.

6.0 PROCEDURE

General Guidelines and Requirements:

1. Count rate measurements will be made with a gamma scintillation detector coupled to a Ludlum model 2221 ratemeter/scaler, or equivalent.

2. Personnel performing measurements shall take the necessary precautions to maintain their exposures as low as reasonably achievable. The following precautionary measures should be considered.

   A. Perform a review of previous surveys (if available) and operations performed in the area to determine the expected radiation exposure rates which will be encountered.

   B. Ensure instrument operability prior to entering the borehole area.

C. Ensure that necessary support equipment is available (recording equipment, watch, bags for contamination control if applicable, etc.) prior to entering the area or surrounding controlled area.

3. If an instrument must be carried through or into a contaminated or potentially contaminated area and is likely to become contaminated, ensure the instrument is enclosed in protective material prior to entering the area.

<u>Equipment</u>

1. NaI detectors:
   3/8 x 3/8 inch for 5 foot boreholes (manually driven boreholes)
2. Portable ratemeter/scaler
3. Indelible ink pens
4. Downhole gamma logging and quality control forms (see attachments)

<u>Gamma Radiation Logging Procedure:</u>

1. Record all required survey and instrument information on the Downhole Gamma Logging form.

2. Determine the borehole location on the referenced grid system established for the site.

3. Install the borehole manually with a jackhammer, or other shallow borehole-forming equipment.

4. Perform source check, battery check, and background check. Record data on quality control forms.

5. Attach a string to the detector, clearly marked with black indelible ink at six inch intervals.

6. Starting at the surface, directly over the borehole, collect 30 second count readings. Record the number of counts on a data sheet. Lower detector into the hole, stopping when the center of the NaI crystal is six inches below the ground surface. Collect 30 second count readings.

7. Continue to collect 30 second count measurements at six inch intervals until reaching the bottom of the borehole. Most boreholes will be 5 feet in depth.

7.0 ATTACHMENTS

Downhole Gamma Logging Form

Quality Control Form

MALCOLM PIRNIE, INC.
FUSRAP MAYWOOD SUPERFUND SITE
PROJECT NO. DACW41-99-D-9001
SUBSURFACE GAMMA-RAY RADIATION LOG

COUNT TIME: 30 seconds
DATE:

SURVEYORS:
DEPTH UNITS: Feet
INSTRUMENT:

HOLE #:				COORDINATES (X,Y):			
DEPTH	GAMMA READING	DEPTH	GAMMA READING	DEPTH	GAMMA READING	DEPTH	GAMMA READING
0.5		5.5					
1		6					
1.5		6.5					
2		7					
2.5		7.5					
3		8					
3.5		8.5					
4		9					
4.5		9.5					
5		10					

DETECTOR MODEL #: SERIAL #:

SCALER MODEL #: SERIAL #:

COMMENTS:

MALCOLM PIRNIE, INC.

QUALITY CONTROL FORM

METER : ____________________
SERIAL NUMBER: ____________________

DETECTOR: ____________________
SERIAL NUMBER: ____________________

			SOURCE			BACKGROUND	SOURCE		
DATE	TIME	HV SET	TYPE	SERIAL NO.	ACTIVITY	COUNTS/MINUTE	COUNTS/MINUTE	OK	INITIALS

Routine Operations Procedure for ISOCS Measurements of Surface Soil

SW-MWD-103-0

(This SOP is currently under review, but will be included in this Appendix as soon as it is approved)

Routine Operations Procedure for ISOCS Measurements of Subsurface Soil

SW-MWD-104-0

(This SOP is currently under review, but will be included in this Appendix as soon as it is approved)

ISOCS Management Procedure

SW-MWD-106-0

(This SOP is currently under review, but will be included in this Appendix as soon as it is approved)

Radiation Exposure Surveys and Scans

SW-MWD-107-0

STANDARD OPERATING PROCEDURE FUSRAP MAYWOOD SUPERFUND SITE STONE & WEBSTER ENGINEERING CORPORATION		
TITLE: **Radiation Exposure Rate Surveys and Scans**	NO.:	SW-MWD-107-0
	PAGE	1 of 4
	DATE:	May 1999
APPROVED: Project Manager Project Engineer		

1.0 PURPOSE

The purpose of this procedure is to provide guidelines and requirements for the performance of radiation exposure rate surveys and scans.

2.0 SCOPE

This procedure is applicable to all personnel involved in the characterization of the radiation exposure rate along outdoor or indoor areas of concern.

3.0 REFERENCES

None.

4.0 DEFINITIONS

Radiation exposure rate surveys, as used in this procedure, are comprised of exposure rate measurements collected along a grid pattern. They are performed to investigate the potential for contamination with gamma ray emitting radionuclides.

Radiation exposure rate scans, as used in this procedure, are synonymous with walkover exposure rate monitoring (as opposed to surveys using a grid system). Exposure rate data are usually recorded on a property map and/or with a Global Positioning System (GPS).

5.0 RESPONSIBILITIES

5.1 Project Manager

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified to perform radiation exposure rate surveys and scans.

5.2 Project Engineer

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for the radiation exposure rate surveying and scanning task.

5.3 Site Safety and Health Officer

All field activities must be carried out in accordance with a site-specific SSHP. The Site Safety and Health Officer is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.4 Project Superintendent

The Project Superintendent is the individual designated by the project manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed on conducting radiation exposure rate surveys and scans in accordance with the project requirements, this SOP, and related SOPs. He or she assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin, and that all necessary personnel are mobilized on time. The Project Superintendent maintains a daily log of activities each work day.

The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected encounters during field investigations and deviations from this SOP.

6.0 PROCEDURE

General Guidelines and Requirements

1. Exposure rate measurements will be made with a Ludlum model 44-2 NaI gamma scintillation detector coupled to a Ludlum model 12 ratemeter, or equivalent.

2. Personnel performing radiation surveys and scans shall take the necessary precautions to maintain their exposures as low as reasonably achievable. The following precautionary measures should be considered.

   A. Perform a review of previous surveys and/or scans (if available) and operations performed in the area to determine the expected radiation exposure rates which will be encountered.

   B. Ensure instrument operability prior to entering the area to be surveyed or the controlled area surrounding the area to be surveyed.

3. Ensure that necessary support equipment is available (recording equipment, watch, bags for contamination control if applicable, etc.) prior to entering the area or surrounding controlled area.

4. If an instrument must be carried through or into a contaminated or potentially contaminated area and is likely to become contaminated, ensure the instrument is enclosed in protective material prior to entering the area.

5. Enter survey areas with instrument set on a scale appropriate for expected radiation levels. (Avoid saturation of the detector).

6. Radiation surveys and scans shall be taken in such a manner that no portion of the surveyor's body is placed between the sensitive portion of the detector and the source of radiation. For example, the surveyor should not wrap his/her hand completely around the instrument probe. The probe should be held at the base. This will ensure that the most accurate measurements possible are obtained.

Equipment

1. Map(s) of site being surveyed
2. Portable gamma exposure rate detectors and ratemeters
3. Indelible ink pens
4. Exposure rate and quality control forms

Preliminary Tasks

Prior to taking measurements, the following tasks must be completed:

1. Observe general guidelines and requirements above.

2. Prior to beginning data acquisition, obtain or draw maps for area to be surveyed or scanned.

3. Prior to beginning data acquisition, log all required survey/scan and instrument information on exposure rate survey form.

4. Prior to beginning data acquisition, perform source check, battery check, voltage check, and background check. Record data on a quality control form.

Survey Procedure

1. If warranted by study needs, establish a reference grid system over the general areas of interest. Each grid will consist of a system of intersecting lines referenced to a fixed site location or benchmark at 10 and 5 meter intervals for outdoor and indoor areas, respectively. For indoor surveys, grids should be constructed over the floor and along the walls to a height of two meters. It should be noted that a GPS may be used to perform the survey, in lieu of establishing a gridded area.

2. Perform grid-point measurements at the grid line intersections with the NaI detector at one meter height above the ground surface. Record the location coordinates and measurement data on the exposure rate survey form.

Scanning Procedure

Starting at one corner of the area or property to be scanned, walk along the edge of the property at about 0.5 meters per second, and slowly move the Ludlum 44-2 back and forth across the ground surface. A width of about six feet should be covered with each pass. Describe areas exhibiting exposure rates that are greater than two times background in a field notebook. These areas shall also be delineated on a sketch of the property and/or within the State Plane Coordinate System using a GPS.

MALCOLM PIRNIE, INC.
FUSRAP MAYWOOD SUPERFUND SITE
PROJECT NO. DACW41-99-D-9001
EXPOSURE RATE SURVEY FORM

SITE: ______________________ **DATE :** ____________

INVESTIGATOR: ________________ **TIME :** ____________

COORDINATES		cpm	cpm
X	Y	surface	1 meter

COORDINATES		cpm	cpm
X	Y	surface	1 meter

COORDINATES		cpm	cpm
X	Y	surface	1 meter

EQUIPMENT	MODEL #	SERIAL #
RATEMETER		
DETECTOR		

BKG (cpm):

COMMENTS : ____

SIGNATURE ____________________ QC CHECK ____________________

Global Positioning System (GPS) Survey

SW-MWD-108-0

STANDARD OPERATING PROCEDURE
FUSRAP MAYWOOD SUPERFUND SITE
STONE & WEBSTER ENGINEERING CORPORATION

TITLE: Global Positioning System (GPS) Survey	NO.:	SW-MWD-108-0
	PAGE	1 of 3
	DATE:	September 21, 1999

APPROVED:

____
Project Manager

____
Project Engineer

1.0 PURPOSE

The purpose of this procedure is to provide guidelines and requirements for the locating of sampling points with a Global Positioning System (GPS).

2.0 SCOPE AND APPLICATION

This procedure is applicable to all personnel involved in using the GPS to document sampling locations.

3.0 REFERENCES

<u>Surveying and Mapping Product Training, Real-time Surveying</u>. Trimble Navigation Ltd., 1998.
<u>Survey Controller Reference Manual, TSC1</u>, Trimble Navigation Ltd., December 1997.
<u>4400 Reference Manual</u>, Trimble Navigation Ltd., May 1996.

4.0 DEFINITIONS

GPS - A GPS is a satellite-based positioning system, operated/controlled by the U.S. Department of Defense. The GPS includes 24 satellites, and can be used by anyone who has a GPS receiver. The GPS receiver is used for position determination, navigation, and survey tasks on land, sea, and in the air.

5.0 RESPONSIBLITIES

5.1 Project Manager

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified to use the GPS for locating sampling points.

5.2 Project Engineer

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for using the GPS to locate sampling points.

5.3 Site Safety and Health Officer

All field activities must be carried out in accordance with a site-specific SSHP. The Site Safety and Health Officer is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.4 Project Superintendent

The Project Superintendent is the individual designated by the project manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed on using the GPS to located sampling points in accordance with the project requirements, this SOP, and related SOPs. He or she assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin, and that all necessary personnel are mobilized on time. The Project Superintendent maintains a daily log of activities each work day.

The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected encounters during field investigations and deviations from this SOP.

6.0 PROCEDURE

The method of utilizing GPS varies with each application and the type of GPS equipment used. Operating methods range from low precision code phase systems to highly accurate carrier phase systems that facilitate on-the-fly measurements, also known as real-time kinematic surveying (RTK). Generally, the RTK system includes a GPS antenna, a GPS receiver, a radio modem and radio antenna, and a data collector for both the roving and the base stations. The first step in the RTK process is the base GPS antenna sends the observed satellite signals to the base receiver. The base receiver then sends the raw GPS data and base position to the radio modem. The base radio modem proceeds to send the observed data and base position to the roving radio modem.

Finally, the roving receiver processes the observed data from both receivers and computes the roving position relative to the base.

Equipment and Materials

1) Trimble 4400 Site Surveyor base and roving stations with related cables, power supplies, and location equipment
2) Trimble 4400 L1/L2 GPS base and roving antennas
3) Trimble TSC1 data collector
4) Pacific Crest radios with antennas
5) Trimble backpack with related cables

Tasks

1) Plan site visit. Check for adequate satellite coverage, determine approximate locations of necessary benchmarks, and find location for setup of base station.
2) At site, setup base receiver, GPS antenna, radio antenna and modem, and necessary power supplies.
3) Start base receiver and rover receiver.
4) Start survey (typically RTK).
5) Perform GPS site calibration using surveyed benchmarks or known points.
6) Measure sampling points, and enter feature codes, if necessary.
7) When finished with survey, end survey, and power down receivers.
8) Download survey data and use as necessary.

Quality Control

GPS typically has quality control features that are built into the system. The system will not allow measurements to be taken if there are not enough satellites available to provide accurate readings, if the satellite geometry is not conducive to the survey, if any radio signals are lost, and for other reasons. Some systems also maintain quality control records during a survey that contain information about the quality of the GPS position, including the number of available satellites, satellite geometry, horizontal and vertical precision levels. These records can be accessed at any time during or after a survey in order to assure that the necessary quality standards are being met.

Procedure for Comparative ISOCS and Soil Sample Measurements
(This SOP is currently under review, but will be included in this Appendix as soon as it is approved)

SW-MWD-109-0

Rock Coring

SW-MWD-203-0

TITLE:	NO.:	SW-MWD-203-0
Rock Coring	PAGE	1 of 5
	DATE:	May 1999

APPROVED:

____
Project Manager

____
Project Engineer

1.0 Introduction

This procedure presents the techniques for collecting and describing rock cores using standard bedrock coring methods. This procedure is intended for use on the FUSRAP Maywood Superfund Site.

2.0 Limitations

This Standard Operating Procedure (SOP) should be used in conjunction with task-specific work plans involving rock coring.

3.0 Equipment

- Knife
- Ruler
- Permanent marker
- 10x Hand lens
- Hydrochloric acid
- Camera with color film
- Munsell Color Chart
- Wire-line coring device

4.0 Methodology

Bedrock cores will be collected with either a NX or HQ size wire-line coring device. The core barrel will be lowered to the bottom of the boring and fitted inside of the coring casing.

The top of the casing will be connected to the drilling rig and rotated. Water will be pumped down the borehole to cool the core barrel bit. Once the core is finished, the core barrel will be removed and brought to the surface. The core will be carefully removed from the core barrel and placed in the wooden core box labeled with the project name, project number, date, time, boring name, interval samples, and Rock Quality Designation (RQD). Additional information to include on the boring log will include start and stop of core run, depth to the top and bottom of the core run, and size and type of core barrel used. The core will be described as outlined below.

1. Place the core sample in natural light, remove any extraneous material and wash the sample, if necessary.

2. Describe the wetted rock core using the following criteria:

   a. Rock Classification
   b. Rock Type
   c. Color
   d. Bedding Thickness
   e. Fracturing
   f. Recovery
   g. Weathering

3. Provide further detail of samples based on following steps:

   -measure the length of the core;
   -calculate the percent recovery;
   -count and log the natural fractures and artificial (drilling-related) core breaks;
   -calculate the RQD as described in Section 5.0;

4. Document the description in the Field Log Book and on the geologic log forms.

   a. Rock Classification

   Classify the rock using the Colorado School of Mines Classification System.

   b. <u>Rock Type</u>

   Identify the rock type and formation. Example, Lockatong Argillite, Passaic Sandstone, Stockbridge Limestone, Inwood Marble, Manhattan Granitic Gneiss.

c. Color

Rock colors should be described utilizing a Munsell Color Chart. A single color descriptor preceded, when necessary, by a modifier to denote variations in shade or color mixtures should be used when describing color. A rock could, therefore, be referred to as gray, or light gray, or blue-gray. Since color can be used in correlating units between sampling locations, it is important that color descriptions be kept consistent throughout the field operations. Rock core samples should be described while wet.

d. Bedding Thickness

Bedding thickness designations for rock classification are given in Table 1.

e. Fracturing

Determine the degree of fracturing of a rock by measuring the fractures or joint spacing. After eliminating drilling breaks, the average spacing is calculated and the fracture structure is described by the following terms.

Very broken (V.BR.) - Less than 2 in.
Broken (BR.) - 2 in. to 1 ft.
Blocky (BL.) - 1 to 3 ft.
Massive (M.) - 3 to 10 ft.

The structural integrity of the rock can be approximated by calculating the RQD of cores recovered. RQD is described in Section 5.0.

f. Recovery

Calculate the recovery using the following formula:

Recovery (%) = (Length of Core Retrieval / Length of Core Run) x 100

g. Weathering

The degree of weathering is important in determining weathering profiles and is also useful in engineering designs. The following terms can be applied to distinguish the degree of weathering.

Fresh - Rock shows little or no weathering effect. Fractures or joints have little or no staining and rock has a bright appearance.

Slight - Rock has some staining which may penetrate several centimeters into the rock. Clay filling of joints may occur. Feldspar grains may show some alteration.

Moderate - Most of the rock, with exception of quartz grains, is stained. Rock is weakened due to weathering and can be easily broken with hammer.

Severe - All rock including quartz grains is stained. Some of the rock is weathered to the extent of becoming a soil. Rock is very soft.

5.0 Rock Quality Designation

The RQD is used to indicate rock mass properties. RQD is based on a modified core recovery procedure which, in turn, is based indirectly on the number of fractures or solution cavities in the rock as observed in the rock cores. The RQD is an indicator of the general quality of the rock for both engineering and geological purposes and provides a numerical value which is more sensitive and consistent than gross percentage core recovery. The length of only those pieces of hard and sound core which are 4-inches or greater in length is divided by the total length of the core run.

$$RQD = \text{sum of length of pieces} > 4 \text{ inches long} / \text{length of coring run}$$

Note: the total core recovery may be greater than that portion which consists of pieces greater than or equal to 4-inches in length. The RQD is expressed as a percentage.

TABLE 1 BEDDING THICKNESS CLASSIFICATION		
THICKNESS (METRIC)	*THICKNESS (APPROX. ENGLISH EQUIVALENT)*	*CLASSIFICATION*
>1.0 meter	>3.3 feet	Massive
30 cm - 1 meter	1.0 ft - 3.3 ft	Thick Bedded
10 cm - 30 cm	4 in - 1.0 ft	Medium Bedded
3 cm - 10 cm	1 in. - 4 in.	Thin Bedded
1 cm - 3 cm	2/5 in. - 1 in.	Very Thin Bedded
3 mm - 1 cm	1/8 in - 2/5 in.	Laminated
1 mm - 3 mm	1/32 in. - 1/8 in.	Thinly Laminated
<1 mm	<1/32 in.	Micro Laminated

Sediment Sampling

SW-MWD-301-0

TITLE: **Sediment Sampling**	**NO.:**	SW-MWD-301-0
	PAGE	1 of 9
	DATE:	May 1999

APPROVED:

Project Manager

Project Engineer

1.0 PURPOSE

This Standard Operating Procedure (SOP) - Sediment Sampling is to be employed when hand-collecting (without machines or power tools) sediment samples from swamps, ponds, lagoons, lakes, rivers and other water bodies with known or suspected environmental contamination at the FUSRAP Maywood Superfund Site.

This SOP describes the procedures for collecting representative environmental and/or geotechnical samples from sediment. The following sections describe various methods and equipment used to collect sediment samples. These samples can be used for sediment classification and analytical testing purposes.

2.0 SCOPE

This procedure presents the proper methods of collecting both discrete and composite sediment samples. Selection of site-specific sampling locations and specific sampling technique(s) is dependent on the objectives of the environmental assessment. Consult the task-specific Sampling and Analysis Plan (SAP) or other applicable work plan(s) for sediment sampling locations and techniques. This method can be used for most sediment types. Sediment samples can be collected from swamps, ponds, lagoons, lakes, rivers and other water bodies. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sampling team member. Various methods can be used to collect the sediment sample. Field changes to this SOP shall be discussed with the Project Superintendent prior to implementation and shall be documented in project field log books. All changes shall be made in accordance with the Maywood Contractor Quality Control Plan.

3.0 REFERENCES

U.S. Environmental Protection Agency, Characterization of Hazardous Waste Sites - A Methods Manual, Volume II: Available Sampling Methods, EPA/600/X-83/018, March 1983.

Decontamination SOP
Cuttings and Fluids Management SOP
Surface Water Sampling SOP
Labeling, Packaging, and Shipping Environmental Samples SOP

4.0 DEFINTIONS

None.

5.0 RESPONSIBILITIES

5.1 PROJECT MANAGER

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified for the needed work.

5.2 PROJECT ENGINEER

Translates client's requirements into technical direction of project. Reviews and approves technical progress, and ensures that the Project Superintendent has been properly briefed and is prepared for sediment sampling task.

5.3 SITE SAFETY AND HEALTH OFFICER

All field activities must be carried out in accordance with the SSHP. The Site Safety and Health Officer (who may also serve as a sediment sampler) is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.4 PROJECT SUPERINTENDENT

The Project Superintendent is the individual designated by the Project Manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed in conducting the method of sediment sampling chosen in accordance with the project requirements, this SOP and related SOPs. This individual assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin and that all necessary personnel are mobilized on time. He/she maintains a daily log of activities each work day.

The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected occurrences during sediment sampling and deviation from this SOP.

5.5 SITE PERSONNEL

Site personnel assigned to perform the sediment sampling activities will be trained in the proper techniques for conducting the work. All employees who are engaging in sediment sampling activities are required to read and sign the Site Safety and Health Plan (SSHP) and to follow the procedures in this SOP, unless superseded by other project-specific requirements. All sediment sampling activities, including deviations to this SOP, will be recorded in field logbooks during on-site activities.

6.0 PROCEDURES

6.1 GENERAL EQUIPMENT & MATERIAL REQUIREMENTS FOR SEDIMENT SAMPLING

The following is a list of equipment & material which is commonly used on all sediment sampling projects. Refer also to related SOP equipment & material requirements to ensure completeness.

- Field Sampling Plan (FSP) (in Chemical Data Quality Management Plan (CDQMP) and task-specific SAPs
- SSHP. **To be read and signed by all site personnel prior to site activities**
- Personal Protective Equipment
- Field logbook(s)
- Volatile organic compound vapor meter (photoionization detector (PID) and flame ionization detector (FID))
- Decontamination supplies - **See FSP and Decontamination SOP**
- Indelible markers
- Weighted tape measure
- Stainless steel or plastic trowel or shovel
- Sampling Equipment - Dredge; Shovel; Fencepost digger; Scoop; Corer; or PVC Pipe Sampler
- Rope/Line for sampling equipment
- Global Positioning System (GPS) - optional
- Surveyors stakes
- Hammer for pounding stakes
- Flagging Tape
- Camera & Film

- Stainless steel mixing bowls
- Sample bottles and labels
- Chain-of-Custody forms- **See Labeling, Packaging, and Shipping Environmental Samples SOP**
- Chain-of-Custody tape
- Sample Coolers Bubble wrap or other sample packing material
- Ice or pre-cooled "cold" packs - for sample preservation
- Shipping forms (not needed if hand delivered to lab or courier pickup arranged)
- Shipping tape (transparent)
- Duct tape
- Paper towels

Avoid the use of devices plated with chrome or other materials if collecting soil samples for metals analysis. Plating is particularly common with garden implements such as potting trowels.

6.2 GENERAL SEDIMENT SAMPLING PROCEDURES

6.2.1 Pre-Sampling Activities

1. The task-specific SAP should be consulted to determine the sampling methods to be employed and the sampling and monitoring equipment necessary for field activities. Main considerations in determining the method of sampling the sediment should be: depth of water, means of access (boat, dock, from shore, wading into water, etc.), and type of water body (e.g., still water vs. rapidly flowing river).

2. In accordance with the SSHP, a general site survey should be performed prior to site entry. If a boat is to be used for sampling, it is important to note access points - docks, boat ramps, etc.

3. All sampling equipment should be decontaminated prior to each sampling episode. Decontamination procedures are detailed in the Decontamination SOP.

4. As appropriate, all sampling locations should be utility cleared and marked in some manner with stakes and/or flagging. Stakes/flagging are most useful for shallow samples (small stream, swamp/wetlands). Photographs should be taken of shore reference points if using stakes is not practical, e.g., sampling in middle of a river or lake. A detailed sketch of the sample location and location on a map/drawing should also be noted. If specified in the FSP or task-specific SAP, a GPS shall be used to locate unmarkable sampling points.

5. Measure the depth of the water from which the sample will be taken.

6. Any in-situ measurements, e.g. water pH, dissolved oxygen content, etc., should be taken prior to sampling activities.

7. If surface water samples will be taken at the same location, the surface water sampling should be performed prior to sediment sampling, because the sediment sampling activities will suspend fine sediments into the water column. Refer to the Surface Water Sampling SOP.

6.3 SEDIMENT SAMPLING

Appropriate field procedures are as follows:

1. If applicable, screen the area to be sampled using a organic vapor analyzer and record readings in the field log. The FID or PID screen is used as a field safety procedure, as well as for selecting potentially contaminated soil samples

2. The readings should be compared to action levels presented in the SSHP. The operator of the FID or PID must be experienced in its use and aware of the effect of factors such as temperature, humidity, or methane affecting the instrument readings.

3. Retrieve a sediment sample using one of the methods described in Section 6.5.

4. If analyzing the sample for volatile organic compounds, using the EnCore sampler tool, collect the appropriate sample volume directly from the sampling device in the manner discussed in Attachment A.

5. For the remaining analyses, homogenize the sediment collected and obtain a discrete sample using a stainless steel lab spoon or its equivalent. Place the sample into the appropriate numbers of sterile wide-mouth glass soil sample jars with screw on caps. The appropriate order for filling the bottles is:

   a. Semivolatile organic compounds (SVOC)
   b. Total Recoverable Petroleum Hydrocarbons (TRPH)
   c. PCBs/pesticides
   d. Metals
   e. Radionuclides

6. Check that a Teflon liner is present in the cap of all analytical sample jars. Secure the caps tightly. Although chemical preservation of solids is

generally not required, the samples should be refrigerated (normally in iced coolers to approach approximately 4°C) and analyzed within specified holding times. Refer to the Labeling, Packaging, and Shipping Environmental Samples SOP for specific requirements.

7. Label the sample bottle with the appropriate sample tag. Complete all chain-of-custody documents. Refer to the Labeling, Packaging and Shipping Environmental Samples SOP for specific requirements.

8. Record sampling event in the field log book (and on a sample log, if dictated by the task-specific SAP).

9. Decontaminate equipment after use and between sample locations. Also, decontaminate sample containers and/or isolate them (such as sealing in Ziploc bags). Refer to the Decontamination SOP for specific requirements.

6.4 PREPARATION OF COMPOSITE SAMPLES

Sediment samples may be either discrete or composite. A discrete sample represents a single location; it must be used for all volatile organic analyses. A composite sample represents a mixture of sediment from more than one discrete location. If a composite sample is to be obtained, it can be mixed in a shallow high density polyethylene pan, lined with aluminum foil, or in a stainless steel pan. Alternatively, compositing can be done on plastic sheets. However, compositing of samples suspected to be contaminated with organics should be done in a stainless steel bowl due to the potential for introduction of organic contaminants from the plastic sheeting. Stainless steel sieves may be used to remove larger rock fragments and organic matter. Compositing procedures are not appropriate for samples obtained for analysis for volatile organic compounds because the agitation of the sample results in a loss of volatiles from the sample.

The procedure outlined in Attachment B shall be followed for sediment compositing.

6.5 METHOD SPECIFIC SEDIMENT SAMPLING PROCEDURES

6.5.1 Sediment Sampling in Shallow Water Bodies (Wetlands, Brooks, Small Streams)

In these settings, the most appropriate method for obtaining sediment samples is likely wading in and obtaining a sample using a shovel, PVC pipe sampler, or fence pole digger. Proper safety equipment should be worn at all times, including a life jacket, a secured line to the shore, and a "buddy" who remains on the shore. Equipment should be tied off to shore if possible, to ease retrieval if anything is dropped.

Samples should be collected by driving the sampling equipment (shovel, fencepost digger, etc.) into the sediment. The equipment should be brought to the surface slowly, to minimize loss of sample into the water column. The sample should be placed into a receptacle from which analytical samples will be taken. This receptacle will most likely be on shore. Bottling of samples and decontamination of equipment should take place on shore.

Samples shall be collected downstream to upstream, so that any suspended particles will be transported away from the next sample point.

For surveying purposes, if possible, stakes or markers should be placed either at the sample location itself or on each bank or both on the same bank so that the sample point is on the line between the two stakes. The precise location of the sample point can then be specified by measuring the distance from one of the stakes.

6.5.2 Sediment Sampling in Deeper Water Bodies (Lakes, Rivers)

In these settings, the most appropriate method for obtaining sediment samples will be from a dock or bridge, if available, or more likely, a boat. If the water is shallow enough, (less than 3 feet deep), the same methods as specified in Section 6.5.1 may be used. For water depths greater than approximately 3 feet deep, a Ponar or Ekman dredge should be used to obtain the sediment sample. Proper safety equipment should be worn at all times, including a life jacket. Equipment should be tied off to the boat if possible, to ease retrieval if anything is dropped.

The boat should be properly anchored before sampling activities commence. Bow and stern anchors may be required to properly position the boat.

Samples should be collected by tying the sampler to a dedicated rope and dropping the sampling equipment over the side of the boat, through the water and into the sediment. Depending on the equipment being used (e.g. an Ekman dredge), a weight may need to be sent down the line to close the sampler. The rope should be marked at the water surface before withdrawing the sampler. The depth of the sample should then be determined by measuring the length of rope deployed. The equipment should be brought to the surface slowly, to minimize loss of sample into the water column. The sample should be placed into a receptacle from which analytical samples will be taken. In general, Ekman dredges are lighter than Ponar dredges. This makes the Ekman easier to handle, but also less stable in high flow areas. The Ponar dredge is heavier, closes automatically, and typically retrieves more sample.

Samples shall be collected downstream to upstream, so that any suspended particles will be transported away from the next sample point.

Consideration will be given to modifying this procedure if sediment samples must be collected for volatile organic compound analysis.

If multiple sediment samples are being collected from a lake or pond (i.e. a relatively still body of water), sample collection should start with deeper points and move to shallower points.

It is also important to size the boat appropriately. If the work is to be in a fairly small area, it may be best to locate as many operations as possible on shore. If all sampling and decontamination activities must be contained within the boat, care should be taken to minimize the amount of equipment required.

If it is not possible to mark the sample location, photographic evidence of the location (shots of landmarks on shore) and precise locations on maps should be obtained.

6.6 GLOSSARY OF TERMS

<u>Composite Sample</u> - represents a mixture of sediment from more than one discrete location.

<u>Corer</u> - A stainless steel implement typically used for soil samples. Still appropriate for shallow samples or samples in swampy areas.

<u>Discrete Sample</u> - A discrete sample represents a single location. It must be used when collecting sediment samples for volatile organic analyses.

<u>Dredge</u> - Typically a "Ponar" or an "Ekman" dredge. An Ekman dredge is lighter and uses a weighted "slave" which is sent down the rope to trigger the trap to close. The Ponar dredge is heavier, and closes on contact.

<u>FSP</u> Field Sampling Plan

<u>Fencepost digger</u> - Two handled shovel tool which is driven straight down, and then clamped shut by pushing the handles apart.

<u>GPS</u> Global Positioning System

<u>SAP</u> Sampling and Analysis Plan

<u>Shovel</u> - Long or short handle type. Used for obtaining sediment samples directly in shallow areas.

<u>SOP</u> Standard Operating Procedure

<u>SSHP</u> Site Safety and Health Plan

<u>Trowel</u> - Basic garden variety, which resembles a small shovel. Constructed of steel or polypropylene (plastic). The blade of a trowel is generally flat and 5 to 6 inches in length. A scoop (blade has curved edges versus flat) may be substituted if necessary. Both can be purchased with volume calibrations.

<u>Hollow-Stem Hand Auger</u> - a short spiral-bladed metal rod (auger) attached to a handle. Clockwise rotation of the T handle initiates the cutting process. Most of the loose sediment is discharged upwards as the auger moves downwards. However, if the sediment is cohesive, some of it will stick to the auger flight providing a collectable sample at a measurable depth.

<u>Scoop</u> - A jar or other container attached to the end of a pole. Hand made.

7.0 <u>ATTACHMENTS</u>

Attachment A - EnCore Extrusion and Sampling Procedures

Attachment B - Sediment Compositing Procedure

ATTACHMENT A

Disposable En Core™ Sampler

EXTRUSION PROCEDURES

USING THE En Core™ EXTRUSION TOOL

CAUTION! Always use the Extrusion Tool to extrude soil from the En Core Sampler. If the Extrusion Tool is not used, the Sampler may fragment, causing injury.

1. Use a pliers to break locking arms on cap of En Core Sampler. Do not remove cap at this time. **(CAUTION: Broken edges will be sharp.)**
2. To attach En Core Sampler to En Core Extrusion Tool: Depress locking lever on Extrusion Tool and place Sampler, plunger end first, into open end of Extrusion Tool, *aligning slots on coring body with pins in Extrusion Tool*. Turn coring body clockwise until it locks into place. Release locking lever.
3. Rotate and gently push Extrusion Tool plunger knob clockwise until plunger slides over wings of coring body. (When properly positioned plunger will not rotate further.)
4. Hold Extrusion Tool with capped Sampler pointed upward so soil does not fall out when cap is removed. To release soil core, remove cap from Sampler and push down on plunger knob of En Core Extrusion Tool. Remove and properly dispose of En Core Sampler.

Warranty and Disclaimers

IMPORTANT: FAILURE TO USE THE EN CORE™ SAMPLER IN COMPLIANCE WITH THE WRITTEN INSTRUCTIONS PROVIDED HEREIN VOIDS ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

PRINCIPLE OF USE. The En Core Sampler Cartridge System is a *volumetric sampling system designed to collect, store and deliver a soil sample.* The En Core Sampler comes in two sizes for sample volumes of approximately 25 or 5 grams. There are four components: the cartridge with a movable plunger; a cap with two locking arms; a T-handle (purchased separately); and an extrusion handle (purchased separately). NOTE: The En Core Sampler is designed to store soil. It is not designed to store solvent or free product.

The soil is stored in a sealed headspace-free state. The seals are achieved by *three special Viton® * o-rings, two located on the plunger and one on the cap of the Sampler.* **At no time and under no condition should these o-rings be removed or disturbed.**

QUALITY CONTROL. The cartridge is sealed in an airtight package to prevent contamination prior to use. Due to the stringent quality control requirements associated with the use of this system, the disposable cartridge is designed to be used only once.

WARRANTY. En Novative Technologies, Inc. ("En Novative Technologies") warrants that the En Core Sampler shall perform consistent with the research conducted under En Novative Technologies' approval, within thirty (30) days from the date of delivery, provided that the Customer gives En Novative Technologies prompt notice of any defect or failure to perform and satisfactory proof thereof. THIS WARRANTY DOES NOT APPLY TO THE FOLLOWING, AS SOLELY DETERMINED BY EN NOVATIVE TECHNOLOGIES: (a) Damage caused by accident, abuse, mishandling or dropping; (b) Samplers that have been opened, taken apart or mishandled; (c) Samplers not used in accordance with the directions; and (d) Damages exceeding the cost of the sampler. Seller warrants that all En Core Samplers shall be free from defects in title. *THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING ANY INFORMATION PROVIDED BY SALES REPRESENTATIVES OR IN MARKETING LITERATURE. IMPLIED WARRANTIES OF FITNESS AND MERCHANTABILITY SHALL NOT APPLY.* En Novative Technologies' warranty obligations and Customer's remedies, except as to title, are solely and exclusively as stated herein.

LIMITATION OF LIABILITY. IN NO EVENT SHALL EN NOVATIVE TECHNOLOGIES BE LIABLE FOR ANTICIPATED PROFITS, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF REVENUE, DOWN TIME, REMEDIATION ACTIVITIES, REMOBILIZATION OR RESAMPLING, COST OF CAPITAL, SERVICE INTERRUPTION OR FAILURE OF SUPPLY, LIABILITY OF CUSTOMER TO A THIRD PARTY, OR FOR LABOR, OVERHEAD, TRANSPORTATION, SUBSTITUTE SUPPLY SOURCES OR ANY OTHER EXPENSE, DAMAGE OR LOSS, INCLUDING PERSONAL INJURY OR PROPERTY DAMAGE. En Novative Technologies' liability on any claim of any kind shall be replacement of the En Core Sampler or refund of the purchase price. *En Novative Technologies shall not be liable for penalties of any description whatsoever.* In the event the En Core Sampler will be utilized by Customer on behalf of a third party, such third party shall not occupy the position of a third-party beneficiary of the obligation or warranty provided by En Novative Technologies, and no such third party shall have the right to enforce same. All claims must be brought within one (1) year of shipment, regardless of their nature.

En Novative Technologies, Inc.
1241 Bellevue St.
Green Bay, WI 54302
Telephone: 920-465-3960 • Toll Free: 1-888-411-0757
Fax: 920-465-3963

The En Core™ Sampler is covered by One or More of the Following U.S. Patents: 5,343,771; 5,505,098; 5,517,868; 5,522,271. Other U.S. and Foreign Patents Pending.

* Viton® is a registered trademark of DuPont Dow Elastomers.

Disposable En Core™ Sampler

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SAMPLING PROCEDURES

USING THE En Core™ T-HANDLE

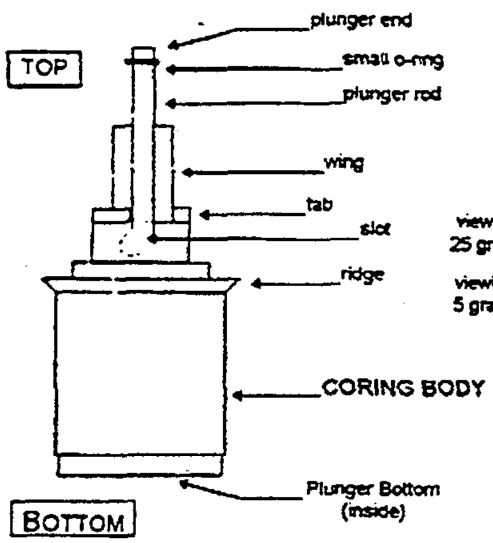
NOTE:

1. En Core Sampler is a SINGLE USE device. It cannot be cleaned and/or reused.

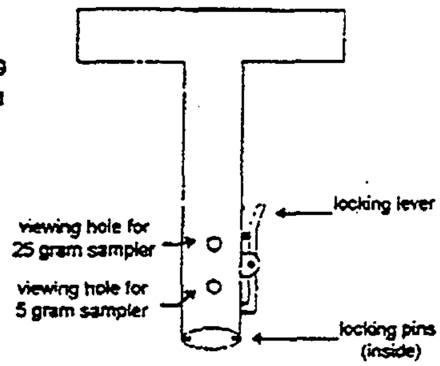
2. En Core Sampler is designed to store soil. Do not use En Core Sampler to store solvent or free product!

3. En Core Sampler must be used with En Core™ T-Handle and/or En Core™ Extrusion Tool exclusively. (These items are sold separately.)

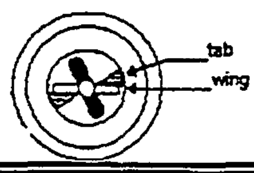
En Core Sampler



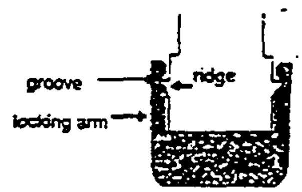
En Core T-Handle



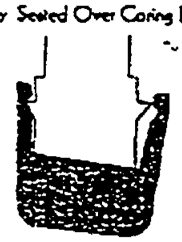
Locked Plunger



Sampler Correctly Capped
(Locking Arm Grooves Seated Over Coring Body Ridge)



Sampler Incorrectly Capped
Cap Appears Crooked. Locking Arm Grooves Not Fully Seated Over Coring Body Ridge



BEFORE TAKING SAMPLE:

1. Hold coring body and push plunger rod down until small o-ring rests against tabs. This will assure that plunger moves freely.

2. Depress locking lever on En Core T-Handle. Place coring body, plunger end first, into open end of T-Handle, *aligning the (2) slots on the coring body with the (2) locking pins in the T-Handle*. Twist coring body clockwise to lock pins in slots. Check to ensure Sampler is locked in place. Sampler is ready for use.

TAKING SAMPLE:

3. Turn T-Handle with T-up and coring body down. This positions plunger bottom flush with bottom of coring body (ensure that plunger bottom is in position). Using T-Handle, push Sampler into soil until coring body is completely full. When full, small o-ring will be centered in T-Handle viewing hole. Remove Sampler from soil. Wipe excess soil from coring body exterior.

4. Cap coring body while it is still on T-handle. *Push and twist* cap over bottom until grooves on locking arms seat over ridge on coring body. CAP MUST BE SEATED TO SEAL SAMPLER (see diagram).

PREPARING SAMPLER FOR SHIPMENT:

5. Remove the capped Sampler by depressing locking lever on T-Handle while twisting and pulling Sampler from T-Handle.

6. Lock plunger by rotating extended plunger rod fully counter-clockwise until wings rest firmly against tabs (see plunger diagram).

7. Attach completed circular label (from En Core Sampler bag) to cap on coring body.

8. Return full En Core Sampler to zipper bag. Seal bag and put on ice.

** TOTAL PAGE.03 **

ATTACHMENT B

SEDIMENT COMPOSITING PROCEDURE

The following procedure will be used for compositing grab samples from sediment collected.

1. Empty the sediment container(s) into a stainless steel mixing bowl.

2. Inspect the material for large stones and other objects, which are not representative of the sample matrix, and remove them from the bowl.

3. Homogenize the remaining sample material by breaking up any large clumps and thoroughly mixing with stainless steel spatula.

4. Fill the sample container(s) using a spatula.

Surface Water Sampling

SW-MWD-302-0

STANDARD OPERATING PROCEDURE **FUSRAP MAYWOOD SUPERFUND SITE** **STONE & WEBSTER ENGINEERING CORPORATION**		
TITLE: **Surface Water Sampling**	**NO.:**	SW-MWD-302-0
	PAGE	1 of 8
	DATE:	May 1999
APPROVED: Project Manager Project Engineer		

1.0 PURPOSE

This Standard Operating Procedure (SOP) - Surface Water Sampling is to be employed when collecting surface water samples from locations with known or suspected environmental contamination at the FUSRAP Maywood Superfund Site.

This SOP describes the procedures for collecting representative environmental samples from surface water. Surface water describes the water above the bottom of a body of water. The samples are typically taken 3 feet above the bottom. Where possible, surface water samples shall not be taken from the surface of a body of water. The following sections describe various methods and equipment used to collect surface water samples. These types of samples can be used for biological and analytical testing purposes.

2.0 SCOPE

This procedure presents the proper methods of collecting surface water samples. Selection of site-specific sampling locations and specific sampling technique(s) is dependent on the objectives of the environmental assessment. Consult the task-specific Sampling and Analysis Plan (SAP) or other applicable work plan(s) for sampling locations and techniques. Field changes to this SOP shall be discussed with the Project Superintendent prior to implementation and shall be documented in project field log books. All changes shall be made in accordance with the Maywood Contractor Quality Control Plan.

3.0 REFERENCES

U.S. Environmental Protection Agency, Characterization of Hazardous Waste Sites - A Methods Manual, Volume II: Available Sampling Methods, EPA/600/X-83/018, March 1983.

Cuttings and Fluids Management SOP
Decontamination SOP
Labeling, Packaging and Shipping Environmental Samples SOP

4.0 DEFINITIONS

None.

5.0 RESPONSIBILITIES

5.1 PROJECT MANAGER

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified for the needed work.

5.2 PROJECT ENGINEER

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for surface water sampling task.

5.3 SITE SAFETY AND HEALTH OFFICER

All field activities must be carried out in accordance with the SSHP. The Site Safety and Health Officer (who may also serve as a surface water sampler) is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.4 PROJECT SUPERINTENDENT

The Project Superintendent is the individual designated by the Project Manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed in conducting the method of surface water sampling chosen in accordance with the project requirements, this SOP and related SOPs. The Project Superintendent assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin and that all necessary personnel are mobilized on time. This individual also maintains a daily log of activities each work day.

The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected occurrences during surface water sampling and deviation from this SOP.

5.5 SITE PERSONNEL

Site personnel assigned to perform the surface water sampling activities will be trained in the proper techniques for conducting the work. All employees who are engaging in surface water sampling activities are required to read and sign the Site Safety and Health Plan (SSHP) and to follow the procedures in this SOP, unless superseded by other project-specific requirements. All surface water sampling activities, including deviations to this SOP, will be recorded in field logbooks during on-site activities.

6.0 PROCEDURE

6.1 GENERAL EQUIPMENT & MATERIAL REQUIREMENTS FOR SURFACE WATER SAMPLING

The following is a list of equipment & material which is commonly used on all surface water sampling projects. Refer also to related SOP equipment & material requirements to ensure completeness.

- Field Sampling Plan (FSP) (in Chemical Data Quality Management Plan) and task-specific SAPs
- SSHP. To be read and signed by all site personnel prior to site activities.
- Personal Protective Equipment
- Field logbook(s)
- Decontamination supplies - See FSP and Decontamination SOP
- Indelible markers
- Water level measure
- Sampling device such as a bailer, bucket, or surface water sampler
- Stakes/flagging (for marking on shore)
- Hammer - for pounding stakes
- 200 foot-length measuring tape
- If required, a hand held Global Positioning System (GPS) instrument
- Sample bottles (pre-preserved) and labels
- Chain-of-Custody forms - See Labeling, Packaging and Shipping Environmental Samples SOP
- Chain-of-Custody tape
- Sample Coolers
- Bubble wrap or other sample packing material

- Ice or pre-cooled "cold" packs - for sample preservation
- Shipping forms (not needed if hand delivered to lab or courier pickup arranged)
- Shipping tape (transparent)
- Duct tape
- Paper towels

6.2 SURFACE WATER PRE-SAMPLING ACTIVITIES

1. The task-specific SAP should be consulted to determine the sampling methods to be employed and the sampling and monitoring equipment necessary for field activities. The main considerations in determining the method of sampling the surface water should be: depth of water, means of access (boat, dock, from shore, wading into water, etc.), and type of water body (e.g., still water vs. rapidly flowing river).

2. In accordance with the SSHP, a general site survey should be performed prior to site entry. If a boat is to be used for sampling, it is important to note access points - docks, boat ramps, etc.

3. All sampling equipment should be decontaminated prior to each sampling episode. Decontamination procedures are detailed in the Decontamination SOP.

4. As appropriate, all sampling locations should be marked in some manner with stakes and/or flagging. Stakes/flagging are useful in some settings (small stream, swamp/wetlands). Photographs should be taken of shore reference points if using stakes is not practical, e.g., sampling in middle of a river or lake. A detailed sketch of the sample location and location on a map/drawing should also be noted. If available, a GPS should be used to locate unmarkable sampling points.

5. Measure the depth of the water from which the sample will be taken.

6. Any in-situ measurements, e.g. water pH, dissolved oxygen content, etc., should be taken prior to sampling activities.

7. If sediment samples will be taken at the same location, the surface water sampling should be performed prior to sediment sampling, because the sediment sampling activities will suspend fine sediments into the water column

6.3 SURFACE WATER SAMPLING

Appropriate field procedures are as follows:

1. Label the sample bottle with the appropriate sample tag. Complete all chain-of-

custody documents. Refer to the Labeling, Packaging and Shipping Environmental Samples SOP for specific requirements.

2. Collect sample by the appropriate method as described in Section 6.4 from an undisturbed area. Allow time for water to clear or sediment to settle if you have just waded into an area or dropped anchor.

3. Surface water samples shall be collected in the following order unless specifically superseded by the task-specific SAP. If a particular task does not require the collection of a particular analyte on the following list, proceed down to the next sample on the list that you are specified to collect.

   a. Volatile organic compounds (VOC)
   b. Semivolatile organic compounds (SVOC)
   c. Total Recoverable Petroleum Hydrocarbons (TRPH)
   d. PCBs/pesticides
   e. Metals
   f. Radionuclides

4. Add preservative, as required by analytical methods, to samples immediately after they are collected if the sample containers are not pre-preserved. Check analytical methods (e.g., EPA SW-846) for additional information on preservation. Check pH for all samples requiring pH adjustment to assure proper pH value. For VOC samples, this will require that a test sample be collected to determine the amount of preservative that needs to be added to the sample containers prior to sampling. Label each sample as collected. Samples requiring cooling (volatile organics, etc) will be placed into a cooler with ice or refrigerant for delivery to the laboratory. Metal samples will not be filtered.

   See Attachment A for the container and preservative requirements for water samples anticipated to be collected. Additional special sample collection considerations are as follows:

   <u>VOCs</u>

   a. Fill the sample vial slowly from sampler, minimizing air entrainment, until vial overflows (a meniscus should be present on the top of the sample bottle). Cap vial.

   b. Invert bottle and tap to check for air bubbles. If bubbles are present, open bottle, add additional water, and repeat this process until no air bubbles are present. If bubbles cannot be removed, the sampler should sample again using a different vial.

ELEVATED RADIONUCLIDES

In surface water locations with elevated radionuclides, dedicated sampling equipment may be appropriate.

5. Record sampling event in the field log book and on a sample log, if dictated by the task-specific SAP.

6. Decontaminate equipment after use and between sample locations. Also, decontaminate sample containers and/or isolate them (such as sealing in Ziploc bags). Refer to the Decontamination SOP for specific requirements.

6.4 METHOD SPECIFIC SURFACE WATER SAMPLING PROCEDURES

6.4.1 Surface Water Sampling in Shallow Water Bodies (Wetlands, Brooks, Small Streams)

In these settings, the most appropriate method for obtaining surface water samples is likely wading in and obtaining a sample using a bailer, bucket, or certified clean sample bottle. Proper safety equipment should be worn at all times, including a life jacket, a secured line to the shore, and a "buddy" who remains on the shore. Equipment should be tied off to shore if possible, to ease retrieval if anything is dropped.

Samples should be collected by measuring the depth of the water, determining how deep a sample is appropriate, and collecting the sample. Sample bottles should be filled directly from the sampler. This will likely necessitate frequent trips to shore. Decontamination of equipment should take place on shore.

Samples shall be collected downstream to upstream, so that any suspended particles from activities in the water body will be transported away from the next sample point.

For surveying purposes, if possible, stakes or markers should be placed either at the sample location itself or on each bank or both on the same bank so that the sample point is on the line between the two stakes. The precise location of the sample point can then be specified by measuring the distance from one of the stakes.

6.4.2 Surface Water Sampling in Deeper Water Bodies (Lakes, Rivers)

In these settings, the most appropriate method for obtaining surface water samples will be from a dock or bridge, if available, or more likely, a boat. If the water is shallow enough, (less than 3 feet deep), the same methods as specified in Section 6.4.1 may be used. For water depths greater than approximately 3 feet deep, a surface water sampler should be used to obtain the surface water sample. Surface water samplers are open at both ends, with end caps held open by a strong elastic. A remote weight is sent down the line to depress the catch which is holding the elastic. This closes both ends of the sampler. The sample is collected from a spout located on the sampler.

Proper safety equipment should be worn at all times, including a life jacket. Equipment should be tied off to the boat if possible, to ease retrieval if anything is dropped.

The boat should be properly anchored before sampling activities commence. Bow and stern anchors may be required to properly position the boat.

Samples should be collected by tying the sampler to a dedicated rope and dropping the sampling equipment over the side of the boat. Depending on the equipment being used, a weight may need to be sent down the line to close the sampler. The rope should be marked at the water surface before withdrawing the sampler. The depth of the sample should then be determined by measuring the length of rope deployed.

Samples shall be collected downstream to upstream, so that any suspended particles will be transported away from the next sample point. Sediment will be disturbed by the anchors and other activities.

If multiple surface water samples are being collected from a lake or pond (i.e. a relatively still body of water), sample collection should start with deeper points and move to shallower points.

It is also important to size the boat appropriately. If the work is to be in a fairly small area, it may be best to locate as many operations as possible on shore. If all sampling and decontamination activities must be contained within the boat, care should be taken to minimize the amount of equipment required.

If it is not possible to mark the sample location, photographic evidence of the location (shots of landmarks on shore), GPS coordinates, and precise locations on maps should be obtained.

6.5 GLOSSARY OF TERMS

FSP Field Sampling Plan

GPS Global Positioning System

SAP Sampling and Analysis Plan

SOP Standard Operating Procedure

SSHP Site Safety and Health Plan

7.0 ATTACHMENTS

Attachment A – Container Requirements for Water Samples

ATTACHMENT A
CONTAINER REQUIREMENTS FOR WATER SAMPLES

Analyte Group	Container	Preservative
Volatile Organic Compounds	3 - 40 ml glass vials with Teflon-lined septum (no headspace)	HCL to pH <2 Cool, 4°C
Semivolatile Organic Compounds	2 - 1L amber glass bottle with Teflon-lined lid	Cool, 4°C
Pesticides/PCBs	2 - 1L amber glass bottle with Teflon-lined lid	Cool, 4°C
Metals	1 – 1000 ml plastic or glass bottle	HNO_3 to pH <2 Cool, 4°C
TRPH	2 – 1000 ml glass bottle	HCl to pH<2 Cool, 4°C
Radiolonuclides	1 – 1000 ml plastic or glass bottle	None

Surface and Shallow Subsurface Soil Sampling

SW-MWD-307-0

STANDARD OPERATING PROCEDURE
FUSRAP MAYWOOD SUPERFUND SITE
STONE & WEBSTER ENGINEERING CORPORATION

TITLE: Surface and Shallow Subsurface Soil Sampling	NO.:	SW-MWD-307-0
	PAGE	1 of 7 plus three attachment pages
	DATE:	May 1999

APPROVED:

____
Project Manager

____
Project Engineer

1.0 PURPOSE

This Standard Operating Procedure (SOP) - **Surface and Shallow Subsurface Soil Sampling** is to be employed when hand-collecting (without machines or power tools) soil samples from a depth of one foot or less at sites with known or suspected environmental contamination.

This SOP describes the procedures for collecting representative environmental and/or geotechnical samples from the surface or shallow subsurface soils. The following sections describe various methods and equipment used to collect disturbed soil samples. A disturbed soil sample is a representative sample of a selected geologic unit which has undergone structural alteration as a result of the sampling operation. These types of samples can be used for soil classification, soil index testing, and analytical testing purposes.

2.0 SCOPE

This procedure serves as general guidance on the proper methods of collecting both discrete and composite surface and shallow subsurface soil samples. This procedure can be used in most soil types but is limited to sampling depths of one foot or less below ground surface. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sampling team member. The use of a flat, pointed mason trowel to cut a block of the desired soil can be helpful when undisturbed profiles are required. A stainless steel scoop or lab spoon will suffice in most other applications. Selection of site-specific sampling locations and specific sampling technique(s) is dependent on the objectives of the environmental assessment. Consult the task-specific Maywood Sampling and Analysis Plan for soil sampling locations and techniques. Always consult state-specific or program-specific requirements as well as manufacturer's instructions for equipment use to ensure compatibility of this SOP with project requirements. **Field changes to this SOP shall be discussed with the Project Superintendent prior to implementation and shall be documented in project field log books.**

3.0 REFERENCES

1. SOP – Cuttings and Fluids Management
2. SOP - Decontamination
3. SOP – Labeling, Packaging and Shipping Environmental Samples

U.S. Environmental Protection Agency, Compendium of ERT Soil Sampling and Surface Geophysics Procedures, EPA/540/P-91/006, January 1991.

U.S. Environmental Protection Agency, Characterization of Hazardous Waste Sites - A Methods Manual, Volume II: Available Sampling Methods, EPA/600/X-83/018, March 1983.

4.0 DEFINITIONS

None.

5.0 RESPONSIBILITIES

5.1 PROJECT MANAGER

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified for the needed work.

5.2 PROJECT ENVIRONMENTAL ENGINEER

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for soil sampling task.

5.3 PROJECT SUPERINTENDENT

The Project Superintendent is the individual designated by the project manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed in conducting the method of soil sampling chosen in accordance with the project requirements, this SOP and related SOPs. The Project Superintendent assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin. The Project Superintendent assures that all necessary personnel are mobilized on time and maintains a daily log of activities each workday.

The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected occurrences during soil sampling and deviation from this SOP.

5.4 SITE SAFETY & HEALTH OFFICER

All field activities must be carried out in accordance with a Site Safety and Health Plan (SSHP). The Site Safety and Health Officer (who may also serve as a soil sampler) is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.5 PROJECT CHEMIST

The Project Chemist shall ensure that site personnel use this SOP and the quality requirements described in the Chemical Data Quality Management Plan and the Contractor Quality Control Plan while carrying out surface soil sampling activities. He will inform the laboratory in advance of the number of samples to be shipped and for what parameters they must be analyzed. He will act as the interface between the site personnel and the laboratory.

5.6 SITE PERSONNEL

All employees who are engaging in soil sampling activities are required to read and sign the Site Safety and Health Plan (SSHP) and to follow the procedures in this SOP, unless superseded by project-specific requirements. All soil sampling activities, including deviations from this SOP, will be recorded in field logbooks during on-site activities.

6.0 <u>PROCEDURE</u>

6.1 GENERAL EQUIPMENT & MATERIAL REQUIREMENTS FOR SURFACE SOIL SAMPLING

The following is a list of equipment & material which is commonly used on all surface soil sampling projects. Refer also to related SOP equipment & material requirements to ensure completeness.

- Field Sampling Plan (FSP)
- Site Safety and Health Plan (SSHP). **To be read and signed by all site personnel prior to site activities.**
- Personal Protective Equipment
- Field logbook(s)
- Volatile organic compound (VOC) vapor meter
- Decontamination supplies - **See SOP – Decontamination, and FSP**
- Indelible markers
- Tape measure
- Stainless steel or plastic trowel or shovel
- "T"-handled hollow stem bucket auger or hand corer, if collecting soil samples below a depth of one foot below ground surface
- Surveyors stakes
- Hammer
- Flagging Tape
- Spray paint
- Stainless steel mixing bowls

- Sample bottles and labels
- Chain-of-Custody forms - Labeling, Packaging, and Shipping Environmental Samples
- Chain-of-Custody tape
- Sample Coolers
- Sample packing material
- Ice or pre-cooled "cold" packs - for sample preservation
- Shipping forms (not needed if hand delivered to lab or courier pickup arranged)
- Shipping tape (transparent)
- Duct tape
- Paper towels

Avoid the use of devices plated with chrome or other materials if collecting soil samples for metals analysis. Plating is particularly common with garden implements such as potting trowels.

6.2 PRE-SAMPLING ACTIVITIES

1. The task-specific Sampling and Analysis Plan should be consulted to determine the sampling methods to be employed and the sampling and monitoring equipment necessary for field activities.

2. In accordance with a Site Safety and Health Plan, a general site survey should be performed prior to site entry.

3. All sampling equipment should be decontaminated prior to each sampling episode. Decontamination procedures are detailed in a separate SOP.

4. As appropriate, all utilities in the vicinity of sampling locations should be clearly marked in some manner with stakes and flagging or spray paint.

6.3 SURFACE SOIL SAMPLING

Appropriate field procedures are as follows:

1. Carefully remove the top layer of soil to the desired sample depth with a decontaminated tool.

2. If applicable, screen the area to be sampled using a VOC vapor analyzing meter and record readings in the field log. The VOC screen is used as a field safety procedure. The VOC readings should be compared to action levels presented in the project Health and Safety Plan. The VOC screen can also be used or selecting potentially contaminated soil samples.

3. Obtain a discrete soil sample. If analyzing samples for VOCs using the EnCore sampler tool, collect the appropriate sample volume in the manner discussed in Attachment A.

4. For the remainder of the parameters, place the sample into a stainless steel mixing bowl. Homogenize the sample and place into appropriate sample containers using a stainless steel lab spoon or its equivalent.

5. If required by the Field Sampling Plan, check that a Teflon liner is present in the cap of all analytical sample jars. Secure all caps tightly. Although chemical preservation of solids is generally not required, the samples shall be refrigerated (normally in iced coolers to approach

approximately 4°C). Refer to **SOP - Labeling, Packaging, and Shipping Environmental Samples** for procedure-specific requirements.

6. Label the sample bottle with the appropriate sample tag. Complete all chain-of-custody documents. Refer to **SOP - Labeling, Packaging, and Shipping Environmental Samples** for procedure-specific requirements.

7. Record sampling event in the field log book and on a sample log, if dictated by the Sampling and Analysis Plan.

8. Decontaminate equipment after use and between sample locations. Also, decontaminate sample containers and/or isolate them (such as sealing in Ziploc bags). Refer to **SOP - Decontamination** for procedure-specific requirements.

6.4 SHALLOW SUBSURFACE SOIL SAMPLING

A bucket auger or hand corer, can be advanced to obtain soil samples up to approximately 5 feet below the surface when soil conditions allow. The method is less effective with coarse, granular soils or soils containing cobbles or boulders. Appropriate field procedures are as follows:

1. To make a hand auger borehole, attach the auger bit to a drill rod extension, and attach a "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (twigs, rocks, or litter). It may be necessary to remove the first three to six inches of surface soil for an area approximately six inches in radius around the auger location.

3. Begin augering by pressing down on the handle while manually rotating it. Periodically remove soil cuttings that accumulate on the ground around the auger stem with a decontaminated tool. This will prevent loose material from falling back down into the borehole when removing the auger or adding drill rods. If necessary, the cuttings from each foot of advancement should be screened for VOCs with a photoionization detector (PID) or for other parameters, as appropriate.

4. Compare PID readings to action levels presented in the project Site Safety and Health Plan. The operator of the PID must be experienced in its use and aware of such factors as temperature, humidity, and methane on the readings provided by the PID.

5. After reaching the desired depth, carefully remove the auger/corer from the hole.

6. If analyzing samples for VOCs, using the EnCore sampler tool, collect the appropriate sample volume in the manner discussed in Attachment A.

7. For the remainder of the parameters place the soil sample into a stainless steel mixing bowl and homogenize it. Obtain a discrete soil sample using a stainless steel lab spoon or its equivalent and place in appropriate sample jars. **See Section 6.5 for discussion of discrete vs. composite sample collection.**

8. If required by the Field Sampling Plan, check that a Teflon liner is present in the cap of all analytical sample jars. Secure all caps tightly. Although chemical preservation of solids is

generally not required, the samples shall be refrigerated (normally in iced coolers to approach approximately 4°C). Refer to **SOP - Labeling, Packaging, and Shipping Environmental Samples** for procedure-specific requirements.

9. Label the sample bottle with the appropriate sample tag. Complete all chain-of-custody documents. Refer to **SOP - Labeling, Packaging, and Shipping Environmental Samples** for procedure-specific requirements.

10. Record in the field log book and on a sample log, if dictated by the Sampling and Analysis Plan.

11. Decontaminate equipment after use and between sample locations. Also, decontaminate sample containers and/or isolate them (such as sealing in Ziploc bags). Refer to **SOP - Decontamination** for procedure-specific requirements.

6.5 PREPARATION OF COMPOSITE SAMPLES

Soil samples may be either discrete or composite fragments (refer to your Field Sampling Plan for designated sampling intervals). A discrete sample represents a single sample location within a vertical soil column and at a single horizontal area point. A composite sample represents a mixture of soil from more than one discrete location, either vertically, within the same soil column or horizontally, across an area. If a composite sample is to be obtained, it can be mixed in a shallow high density polyethylene pan, lined with aluminum foil, or in a stainless steel pan. Stainless steel sieves may be used to remove larger rocks. Compositing procedures are not appropriate for samples obtained for analysis for VOCs because the agitation of the sample results in a loss of volatiles from the sample.

The sequence of sample collection (after collection of VOCs) shall be as follows:

a. Semivolatile organic compounds (SVOC)
b. Total Recoverable Petroleum Hydrocarbons (TRPH)
c. PCBs/pesticides
d. Metals
e. Radionuclides

Procedure outlined in Attachment B shall be followed for soil compositing.

6.6 GLOSSARY OF TERMS

<u>Composite Sample</u> - represents a mixture of soil from more than one discrete location.

<u>Discrete Sample</u> - A discrete sample represents a single sample location within a vertical soil column and at a single horizontal area point. Discrete sampling must be used when collecting soil samples for VOC analyses.

<u>Trowel</u> - Resembles a small shovel. To be constructed of steel for sampling purposes. The blade of a trowel is generally flat and 5 to 6 inches in length. A scoop (blade has curved edges versus flat) may be substituted if necessary. Both can be purchased with volume calibrations.

<u>Hand Corer</u> - A hollow metal tube with a detachable, hardened metal cutting nose and a plastic "core catcher" fitting. This tube can be attached to a short spiral-bladed hollow metal rod (auger)

attached to a "T" handle for hand-advancement. Clockwise rotation of the T handle with simultaneously applied downward pressure initiates the cutting process. Most of the soil is discharged upwards through the auger as it moves downwards. When the desired sampling interval is reached, rotation is stopped and the auger is withdrawn from the hole with the soil of interest inside it. If soil is extremely uncohesive (e.g. dry sand), a hand corer should be considered for use.

Hollow-Stem Bucket Auger - a short spiral-bladed hollow metal rod (auger) attached to a "T" handle for hand-advancement. Clockwise rotation of the T handle with simultaneously applied downward pressure initiates the cutting process. Most of the soil is discharged upwards through the auger as it moves downwards. When the desired sampling interval is reached, rotation is stopped and the auger is withdrawn from the hole with the soil of interest inside it. If soil is extremely uncohesive (e.g. dry sand), a hand corer should be considered for use.

7.0 ATTACHMENTS

Attachment A – Disposal EnCore Sampler, Extrusion Procedures

Attachment B – Soil Compositing Procedure

ATTACHMENT A

Disposable En Core™ Sampler

EXTRUSION PROCEDURES

USING THE En Core™ EXTRUSION TOOL

CAUTION! Always use the Extrusion Tool to extrude soil from the En Core Sampler. If the Extrusion Tool is not used, the Sampler may fragment, causing injury.

1. Use a pliers to break locking arms on cap of En Core Sampler. Do not remove cap at this time. **(CAUTION: Broken edges will be sharp.)**
2. To attach En Core Sampler to En Core Extrusion Tool: Depress locking lever on Extrusion Tool and place Sampler, plunger end first, into open end of Extrusion Tool, ***aligning slots on coring body with pins in Extrusion Tool*** Turn coring body clockwise until it locks into place. Release locking lever.
3. Rotate and gently push Extrusion Tool plunger knob clockwise until plunger slides over wings of coring body. (When properly positioned plunger will not rotate further.)
4. Hold Extrusion Tool with capped Sampler pointed upward so soil does not fall out when cap is removed. To release soil core, remove cap from Sampler and push down on plunger knob of En Core Extrusion Tool. Remove and properly dispose of En Core Sampler.

Warranty and Disclaimers

IMPORTANT: FAILURE TO USE THE EN CORE™ SAMPLER IN COMPLIANCE WITH THE WRITTEN INSTRUCTIONS PROVIDED HEREIN VOIDS ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

PRINCIPLE OF USE. The En Core Sampler Cartridge System is a volumetric sampling system designed to collect, store and deliver a soil sample. The En Core Sampler comes in two sizes for sample volumes of approximately 25 or 5 grams. There are four components: the cartridge with a movable plunger; a cap with two locking arms; a T-handle (purchased separately); and an extrusion handle (purchased separately). NOTE: The En Core Sampler is designed to store soil. It is not designed to store solvent or free product.

The soil is stored in a sealed headspace-free state. The seals are achieved by three special Viton® * o-rings, two located on the plunger and one on the cap of the Sampler. At no time and under no condition should these o-rings be removed or disturbed.

QUALITY CONTROL. The cartridge is sealed in an airtight package to prevent contamination prior to use. Due to the stringent quality control requirements associated with the use of this system, the disposable cartridge is designed to be used only once.

WARRANTY. En Novative Technologies, Inc. ("En Novative Technologies") warrants that the En Core Sampler shall perform consistent with the research conducted under En Novative Technologies' approval, within thirty (30) days from the date of delivery, provided that the Customer gives En Novative Technologies prompt notice of any defect or failure to perform and satisfactory proof thereof. THIS WARRANTY DOES NOT APPLY TO THE FOLLOWING, AS SOLELY DETERMINED BY EN NOVATIVE TECHNOLOGIES: (a) Damage caused by accident, abuse, mishandling or dropping; (b) Samplers that have been opened, taken apart or mishandled; (c) Samplers not used in accordance with the directions; and (d) Damages exceeding the cost of the sampler. Seller warrants that all En Core Samplers shall be free from defects in title. THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING ANY INFORMATION PROVIDED BY SALES REPRESENTATIVES OR IN MARKETING LITERATURE. IMPLIED WARRANTIES OF FITNESS AND MERCHANTABILITY SHALL NOT APPLY. En Novative Technologies' warranty obligations and Customer's remedies, except as to title, are solely and exclusively as stated herein.

LIMITATION OF LIABILITY. IN NO EVENT SHALL EN NOVATIVE TECHNOLOGIES BE LIABLE FOR ANTICIPATED PROFITS, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF REVENUE, DOWN TIME, REMEDIATION ACTIVITIES, REMOBILIZATION OR RESAMPLING, COST OF CAPITAL, SERVICE INTERRUPTION OR FAILURE OF SUPPLY, LIABILITY OF CUSTOMER TO A THIRD PARTY, OR FOR LABOR, OVERHEAD, TRANSPORTATION, SUBSTITUTE SUPPLY SOURCES OR ANY OTHER EXPENSE, DAMAGE OR LOSS, INCLUDING PERSONAL INJURY OR PROPERTY DAMAGE. En Novative Technologies' liability on any claim of any kind shall be replacement of the En Core Sampler or refund of the purchase price. En Novative Technologies shall not be liable for penalties of any description whatsoever. In the event the En Core Sampler will be utilized by Customer on behalf of a third party, such third party shall not occupy the position of a third-party beneficiary of the obligation or warranty provided by En Novative Technologies, and no such third party shall have the right to enforce same. All claims must be brought within one (1) year of shipment, regardless of their nature.

En Novative Technologies, Inc.
1241 Bellevue St.
Green Bay, WI 54302
Telephone: 920-465-3960 • Toll Free: 1-888-411-0757
Fax: 920-465-3963

The En Core™ Sampler is covered by One or More of the Following U.S. Patents: 5,343,771; 5,505,098; 5,517,868; 5,522,271. Other U.S. and Foreign Patents Pending.

* Viton® is a registered trademark of DuPont Dow Elastomers.

Disposable En Core™ Sampler

SAMPLING PROCEDURES

USING THE En Core™ T-HANDLE

En Novative Technologies, Inc.
1241 Bellevue Street
Green Bay, WI 54302
Telephone: 920-465-3960 • Toll Free: 1-888-411-0757
Fax: 920-465-3963

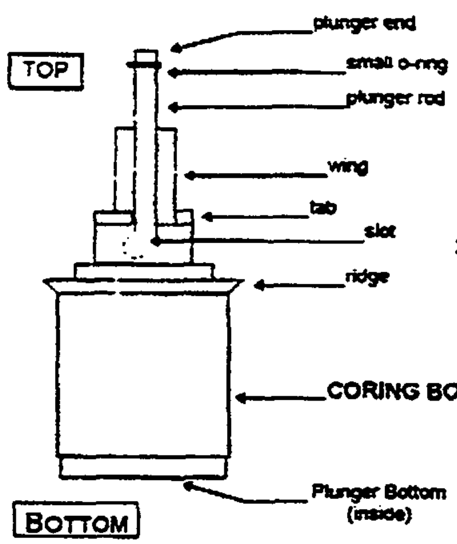
NOTE:

1. En Core Sampler is a SINGLE USE device. It cannot be cleaned and/or reused.

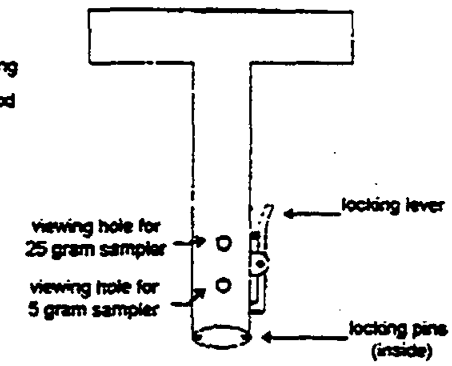
2. En Core Sampler is designed to store soil. Do not use En Core Sampler to store solvent or free product!

3. En Core Sampler must be used with En Core™ T-Handle and/or En Core™ Extrusion Tool exclusively. (These items are sold separately.)

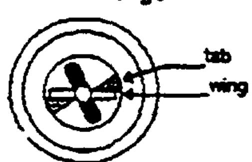
En Core Sampler



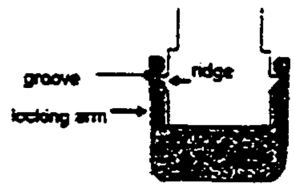
En Core T-Handle



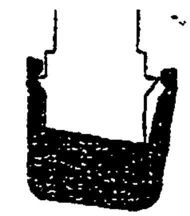
Locked Plunger



Sampler Correctly Capped
(Locking Arm Grooves Seated Over Coring Body Ridge)



Sampler Incorrectly Capped
Cap Appears Crooked. Locking Arm Grooves Not Fully Seated Over Coring Body Ridge



BEFORE TAKING SAMPLE:

1. Hold coring body and push plunger rod down until small o-ring rests against tabs. This will assure that plunger moves freely.

2. Depress locking lever on En Core T-Handle. Place coring body, plunger end first, into open end of T-Handle, *aligning the (2) slots on the coring body with the (2) locking pins in the T-Handle.* Twist coring body clockwise to lock pins in slots. Check to ensure Sampler is locked in place. Sampler is ready for use.

TAKING SAMPLE:

3. Turn T-Handle with T-up and coring body down. This positions plunger bottom flush with bottom of coring body (ensure that plunger bottom is in position). Using T-Handle, push Sampler into soil until coring body is completely full. When full, small o-ring will be centered in T-Handle viewing hole. Remove Sampler from soil. Wipe excess soil from coring body exterior.

4. Cap coring body while it is still on T-handle. *Push and twist* cap over bottom until grooves on locking arms seat over ridge on coring body. CAP MUST BE SEATED TO SEAL SAMPLER (see diagram).

PREPARING SAMPLER FOR SHIPMENT:

5. Remove the capped Sampler by depressing locking lever on T-Handle while twisting and pulling Sampler from T-Handle.

6. Lock plunger by rotating extended plunger rod fully counter-clockwise until wings rest firmly against tabs (see plunger diagram).

7. Attach completed circular label (from En Core Sampler bag) to cap on coring body.

8. Return full En Core Sampler to zipper bag. Seal bag and put on ice.

ATTACHMENT B

SOIL COMPOSITING PROCEDURE

The following procedure will be used for compositing grab samples from the soil piles.

1. Empty the soil container(s) into stainless steel mixing bowls.

2. Inspect the material for large stones and other objects which are not representative of the sample matrix and remove them from the bowl.

3. Homogenize the remaining sample material by breaking up any large clumps and thoroughly mixing with stainless steel spatula.

4. Fill the sample container(s) using a spatula.

Soil Borings and Sampling

SW-MWD-308-0

STANDARD OPERATING PROCEDURE FUSRAP MAYWOOD SUPERFUND SITE STONE & WEBSTER ENGINEERING CORPORATION		
TITLE: Soil Borings and Sampling	NO.:	SW-MWD-308-0
	PAGE	1 of 6 plus two attachment pages
	DATE:	April 1999

APPROVED:

Project Manager

Project Engineer

1.0 PURPOSE

This Standard Operating Procedure (SOP) - **Soil Borings and Sampling** is to be employed when determining the extent of contamination, physical properties, arrangement, and thickness of the various soil and rock strata as they exist in the ground. It is necessary to locate and record the depth at which any change in stratification of the material occurs and the natural groundwater level. The Contractor shall measure and record the depth to the groundwater table in the borings in progress at the start of each work day, and the final groundwater level.

2.0 SCOPE

This procedure serves as general guidance on the proper methods of collecting both discrete and composite soil samples using hollow stem auger techniques. This procedure can be used in most soil types but sampling depths of auger investigations are limited by groundwater conditions, soil characteristics, and the equipment used. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sampling team member. Selection of site-specific sampling locations and specific sampling technique(s) is dependent on the objectives of the environmental assessment. Consult the Maywood task-specific project Sampling and Analysis Plan for soil sampling locations and techniques. Always consult state-specific or program-specific requirements as well as manufacturer's instructions for equipment use to ensure compatibility of this SOP with project requirements. **Field changes to this SOP shall be discussed with the Project Superintendent prior to implementation and shall be documented in project field log books.** Hollow stem auger techniques should be employed without the use of drilling water while drilling on hazardous waste sites. If water is deemed necessary by driller, its use must be approved by the drilling inspector. When water is used to advance boring, it must not be recirculated back into the boring. The drilling inspector should also record any detected odor from boring, and depth encountered.

3.0 REFERENCES

ASTM D1452-80 Soil Investigation and Sampling by Auger Borings

ASTM D 1586 Method For Penetration Test and Split Barrel Sampling Soils

Stone & Webster SOP, Overburden Drilling Methods

Stone & Webster SOP, Decontamination

Stone & Webster SOP, Cuttings and Fluids Management

4.0 DEFINITIONS

None

5.0 RESPONSIBILITIES

5.1 PROJECT MANAGER

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified for the needed work.

5.2 PROJECT ENVIRONMENTAL ENGINEER

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for soil boring and sampling activities.

5.3 CONTRACTOR QUALITY CONTROL SYSTEM MANAGER (CQCSM)

All drilling is inspected continuously by a CQCSM. The geologist or inspector is familiar with the particular drilling program, and is responsible for ensuring that established procedures are followed. The geologist or inspector has the authority to modify the program and/or procedures when warranted by unanticipated field conditions.

The inspector is responsible for maintaining field notes and for keeping a well log independent of the driller.

6.0 PROCEDURES

6.1 Equipment and Materials

The driller shall be capable of providing power-driven sectional hollow stem auger flights with a minimum inside diameter of 3-1/4 inches. In addition, the following equipment shall be present:

a. Drill rods, minimum size equivalent to the "A" rod (1-5/8 inch OD and 1-1/8 inch I.D.)

b. Hollow stem auger plug

c. Drive hammer (1) 300 pound and (1) 140 pound

d. 2-inch OD split spoon sampler

e. Roller bit and diamond corer bit

f. Water tank and pump

6.2 Decontamination Procedures

1. Auger Flites

Prior to drilling at a new test boring site and at the start of each day, all previously used auger flites and related downhole drilling equipment, including casing and hollow stem auger plugs and auger bits, shall be thoroughly steam-cleaned until free of visible soil, grease, or similar debris, to the satisfaction of Stone & Webster representative. The decontaminated equipment shall then be stored on aboveground racks until ready for use.

2. Drill Rig

The working end of the drill rig is steam-cleaned, and the rig is generally inspected by the geologist or inspector for evidence of leaks (i.e., gasoline or diesel fuel and hydraulic fluid).

3. Well Construction Materials

Well construction materials, including casing, screens, protective risers, and/or road boxes, are also steam-cleaned prior to use.

6.3 Boring Procedure

Borings shall be by hollow stem auger. In the event that hollow stem augers produce unsatisfactory results, drive sample drilling techniques will be employed. (see Stone & Webster SOP, Overburden Drilling Methods). Borings shall be advanced by using an auger or cutting, chopping, or tricone bits, subject to the approval of Stone & Webster.

Each borehole shall be advanced by rotary drilling using hollow stem augers of minimum 4-inch inside diameter. The soil samples shall be obtained at continuous 2-foot intervals with a 3-inch OD x 24-inch long split spoon sampler (or as directed by Stone & Webster, a 2-inch OD sampler).

The method for sampling and advancing the hole will be as follows:

1. After rig setup on the test boring site, the first step will be to drive the split spoon sampler from the ground surface to a depth of 24 inches using Standard Penetration Test techniques.

2. Auger drilling will then be used to advance the hole to the base of the soil section sampled (24 inches) and rotation of the auger will continue until cuttings are no longer returned. The auger plug will then be removed and the sampler will be placed in the hole at this new depth and again driven 24 inches.

3. Sampling and augering shall continue in this fashion, continuously sampling and then advancing the boring in 2 foot increments until reaching depth. During this time, the auger bit should never be advanced ahead of the depth to which the sampler had been previously driven.

When an obstruction is met, the driller must attempt to penetrate the obstruction by the use of a roller bit or by coring. If attempts to penetrate obstruction are unsuccessful, boring will be abandoned.

The auger plug must be in place at the auger head while bore hole is being advanced to prevent soil from being transported through auger.

Prior to each sampling, the sampler shall be cleaned and decontaminated.

In addition, the contractor will be required to have the ability to drive casing of sufficient diameter so that the 3 inch split spoon sample can be utilized.

6.4 Split-Spoon Sampling

1. Equipment for obtaining the split-spoon samples shall conform to the requirements of ASTM D 1586.

2. At least four 3.0 inch OD X 24 inch long samplers shall be available on the rig. In addition, 2-inch OD (1-3/8 inch ID) split spoons with a minimum length of 18 inches may be requested for use by Stone & Webster.

3. The drive shoe of the sampler shall be sharpened to form a cutting edge at its inside circumference. The cutting edge shall be maintained in good working condition and replaced as required by Stone & Webster. The sampler shall be fastened to its drill rod by a coupling head embodying a check valve which will permit ready escape of water trapped above the sample as the sampler is driven down into the soil, but which will close as the soil sample and sampler are withdrawn, thus preventing the development of hydrostatic pressure on top of the soil during recovery.

4. The drive hammer assembly shall consist of a hammer, manufactured specifically for standard penetration testing, with a nominal weight of 140 lb for the 2-inch OD sampler and 300 lb for the 3-inch OD sampler, and a guide permitting a free fall of 30 inches. Precautions should be taken to ensure that the energy of the falling hammer is

not reduced by friction between the hammer and the guide.

5. Stone & Webster will examine all drive hammers prior to the start of any split spoon sampling and will reject any damaged equipment. In addition, Stone & Webster may require that the drive hammer be weighed prior to the start of work. Prior to sampling, the sampler shall be cleaned and decontaminated (see Stone & Webster SOP Decontamination).

6. Soils collected from the sampler or brought to the surface by the drilling process are left onsite, unless there are specific instructions to the contrary (see Stone & Webster SOP Cuttings and Fluids Management).

7. Soils will be screened using a NaI scintillation detector for radiological contamination, and a photoionization detector (PID) or a flame ionization detector (FID) for chemical contamination.

8. Once the sampler has been retrieved from the borehole and broken loose from the drill rods, Stone & Webster will take custody of the sampler. Stone & Webster personnel will first split the sampler and place it on clean plastic to avoid contamination. VOA samples will be collected immediately using Encore samplers. Samples for other parameters will be collected in jars. Actual sample container requirements are provided in Table 4-1 of the Quality Assurance Project Plan (QAPP) (which is part of the Chemical Data Quality Management Plan (CDQMP)) and shall also be included in each task-specific SAP. The sequence of sample collection (after collection of VOCs) shall be as follows:
    a. Semivolatile organic compounds (SVOC)
    b. Total Recoverable Petroleum Hydrocarbons (TRPH)
    c. PCBs/pesticides
    d. Metals
    e. Radionuclides

9. Check that a Teflon liner is present in the cap of all analytical sample jars, if required. Secure the caps tightly. Although chemical preservation of solids is generally not required, the samples should be refrigerated (normally in iced coolers to approach approximately 4°C) and analyzed within specified holding times. Refer to the Labeling, Packaging, and Shipping Environmental Samples SOP for specific requirements.

10. Label the sample bottle with the appropriate sample tag. Complete all chain-of-custody documents. Refer to the Labeling, Packaging and Shipping Environmental Samples SOP for specific requirements.

11. Record sampling event in the field logbook and on a sample log, if dictated by the task-specific SAP.

12. Decontaminate equipment after use and between sample locations. Also, decontaminate sample containers and/or isolate them (such as sealing in Ziploc bags). Refer to the Decontamination SOP for specific requirements.

14. When the borehole is completed, the borehole creates the potential for migration of contaminants into previously uncontaminated deposits. Thus, the borehole will be filled with a portland cement and bentonite slurry.

6.5 Records

For each boring, a log will be prepared for each boring that contains the following information:

1. Site location, job designation, boring number, date boring was started and completed, the driller's name, method of advancing the hole, casing diameter and length, sample description (using Unified Soil Classification System, for example) and type and size of the soil samplers used.

2. Depth below ground surface of each stratum of soil encountered.

3. Depth at which each sample of soil was taken, together with the sample number, type of sample, and percent recovery.

4. Where split-spoon samples are taken, the number of blows for each 6 inches of penetration or fraction thereof for each sample. The use of a nonstandard drive hammer or sampler shall be noted whenever applicable.

5. Comments by the inspector on any special conditions which may have been encountered, such as obstacles, cavities, and artisan water conditions.

See Attachment A for an example of a boring log.

Stone & Webster Engineering Corporation	BORING LOG	Boring J.O. Sheet 1 of

Site:

Client:

Coordinates:

Groundwater Depth/Date:

Contractor:

Logged by:

Date Start - Finish: / / - / /

Ground Elevation: ft

Depth to Bedrock:

Total Depth Drilled: ft

Driller:

Rig Type:

Methods:

Drilling Soil:

Sampling Soil:

Drilling Rock:

Casing Used:

Comments:

Elev (ft)	Depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N Value	USC Symbol / Drill Rate (min/ft)	Sample Description

Legend/Notes

- Datum is
- ∇ indicates groundwater level.
- ▌ indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.

* indicates use of 300 pound hammer.

- Sample Type:

Approved	Date

Stone & Webster Engineering Corporation	BORING LOG	Boring J.O. Sheet of

Site: Logged by:

Elev (ft)	depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N Value	USC Symbol / Drill Rate (min/ft)	Sample Description

Note: See Sheet 1 for Boring Summary and Legend Information

Approved Date

Drum Handling and Sampling

SW-MWD-313-0

TITLE:	NO.:	SW-MWD-313-0
Drum Handling and Sampling	PAGE	1 of 23
	DATE:	May 1999

APPROVED:

____
Project Manager

____
Project Engineer

1.0 PURPOSE

This Standard Operating Procedure (SOP) presents the method for handling drums and taking drum samples at the FUSRAP Maywood Superfund Site. This procedure provides the methods for identifying and quantifying hazardous substances so that the appropriate level of protection may be determined. The purpose of this procedure is to ensure that drum handling and sampling is conducted using well-developed and consistent techniques and methods.

2.0 SCOPE

This procedure is applicable to the handling and sampling of closed containers (120 gallon or less) on the Maywood project sites. The contents of these containers may or may not be known depending on the situation. This SOP can be used as applicable in both situations. Bulk tanks such as railroad tank cars, large above- and below ground tanks (with a capacity of more than 120 gallons), and tank trailers are not addressed in this procedure.

3.0 REFERENCES

Standard Operating Procedure for Drum Sampling by Ecology and Environment, Inc. January, 1990.
Corporate Safety, Health, and Environment Manual by Stone & Webster
Labeling, Packaging, and Shipping Environmental Samples SOP
Decontamination SOP

4.0 DEFINITIONS

Air Reactive Wastes - Some chemicals, such as white phosphorus and some of the metallic hydrides, react with the oxygen in the air and combust or produce considerable amounts of heat and may possibly release toxic or flammable vapors.

Compatibility Testing - A series of tests performed on individual drum samples where the object of the testing is to find those drums that have similar and potentially compatible contents. After further testing the contents of these drums would be mixed together to form a larger single waste stream for disposal purposes.

Container - Defined as any drum, bottle, can, bag, etc., with a capacity of 120 gallons (450 liters) or less.

Dosimeter - A portable, transistorized survey meter that can be used for radiation monitoring purposes and/or contamination measurements.

Exotic Metal Drums - (i.e. aluminum, nickel, stainless steel, or other unusual metals). Very expensive drums that usually contain an extremely dangerous material.

Glass Thief - A glass tube 4 feet long and 3/4 inches in diameter, used for taking samples from drums. The tube is usually broken up and disposed of in the drum following sampling.

LEL - (Lower Explosive Limit) An air monitoring device can test the surrounding air for sufficient oxygen content for life support and/or the presence of combustible gases or vapors which may pose a potential flammability hazard. The Lower Explosive Limit is defined as the minimum concentration of a particular combustible gas in the air that can be ignited. The **Upper Explosive Limit** (UEL) is defined as the maximum concentration that can be ignited.

Laboratory Packs - Such drums are commonly used for disposal of expired chemicals and process samples from laboratories, hospitals and similar institutions. Bottles in the laboratory pack may contain incompatible materials and may not be packed in absorbent material. They may contain radioisotopes, shock sensitive, highly volatile, highly corrosive, or very toxic exotic chemicals. Laboratory packs have been the primary ignition sources for fires at some hazardous wastes sites.

Monitox - A portable warning device used for detecting specific toxic gases found in the surrounding air (i.e. H_2S, HCl, Cl, HCN and $COCl_2$).

PID - (photoionization detector) A portable air-monitoring instrument used to detect organic vapors. The PID does not distinguish between different types of vapors or tell if more than one vapor is present.

Polyethylene or PVC-lined drums - Often contain strong acids or bases. If the lining is punctured, the substance usually corrodes the steel, resulting in a significant leak or spill.

Shock Sensitives - A chemical which may undergo a very rapid chemical transformation, with the simultaneous production of large quantities of heat and gases, if introduced to shock (i.e. friction).

Single-Walled Drums Used as a Pressure Vessel - These drums have fittings for both product filling and placement of an inert gas, such as nitrogen. Such drums may contain reactive, flammable, or explosive substances.

Vapor Control - The use of an LEL, PID, Monitox, or any other air monitoring device to assure the quality of air meets all safety requirements.

Waste Blending Test - A waste blending test is done on sample materials from drums that were found to be similar and potentially compatible with each other. The sample materials are proportionally and sequentially blended with each other and observations and measurements are made during and after the blending process to determine if any potentially hazardous reactions are occurring (i.e. temperature rise, outgassing, or other reactions).

Water Reactive Wastes - Some chemicals will react violently with water on contact or through exposure to moisture in the air while others may give off toxic or flammable gasses. Sodium or potassium metal reacts violently with water while calcium carbide reacts to produce a flammable gas (acetylene).

5.0 RESPONSIBILITIES

5.1 Project Manager

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified to perform wipe sampling.

5.2 Project Engineer

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for the wipe sampling task.

5.3 Site Safety and Health Officer

All field activities must be carried out in accordance with a site-specific SSHP. The Site Safety and Health Officer (who may also serve as a wipe sampler) is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.4 Project Superintendent

The Project Superintendent is the individual designated by the Project Manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed on conducting drum handling and sampling in accordance with the project requirements, this SOP, and related SOPs. He or she assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin, and that all necessary personnel are mobilized on time. The Project Superintendent maintains a daily log of activities each work day.

The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected encounters during field investigations and deviations from this SOP.

5.5 Site Personnel

Site personnel assigned to perform the drum handling and sampling activities will be trained in the proper techniques for conducting the work. They are required to read and sign the site-specific SSHP and to follow the procedures in this SOP, unless superseded by other project-specific requirements. All wipe sampling activities, including deviations to this SOP, will be recorded in field logbooks during on-site activities.

6.0 PROCEDURE

6.1 Introduction

The guidance presented is based on field experience in working with containers on uncontrolled hazardous substance sites and on information contained in United State Environmental Protection Agency (USEPA) and other government agency publications. In many cases strict rules cannot be followed, and professional judgment is required because uncontrolled variables are involved. For example, there is always some uncertainty in the identity of a container's contents. Labels cannot be absolutely trusted. Only educated guesses can be made after a thorough review of all available background data, such as potential sources of the wastes.

During many drum projects, several phases will be in progress simultaneously. Air monitoring, dust control, and organic vapor control operations should be in progress throughout the course of the project. The Maywood Site Safety and Health Plan addresses air monitoring procedures to be utilized. Strict adherence to safety precautions will occur during drum handling, opening and sampling. Site Safety and Health Plan procedures and requirements will be adhered to during field activities on-site.

6.2 Drum Handling

In addition to the following procedures, drum handling and sampling activities will be performed in accordance with the Drum and Container Handling Procedure (SHE 9-2) in Stone & Webster's Corporate Corporate Safety, Health, and Environment Manual.

The handling, movement, and transport of drums and other containers should be by use of mechanical equipment only; no drums should be handled manually. Remote drum handling equipment may consist of a grappler equipped backhoe or front-end loader. Drum transportation should be by front-end loaders or fork lifts with modified carrying platforms. Portions of equipment that contact drums or canisters should be constructed of non-ferrous metals or contact portions should be coated or lined to preclude spark generation. Handling and transport equipment must be equipped with full frontal and side splash and explosion shields. Class ABC fire extinguishers will be fitted to the body of each piece of equipment.

6.2.1 General Precautions

Personnel involved in handling and transporting containerized waste will work in teams containing no fewer than two people. Visual contact will be maintained between members of the working team at all times. All members will be able to communicate between themselves and with the Site Safety and Health Officer by intrinsically safe two-way radios at all times on the work site.

Whenever possible, drums or other containers to be sampled should be opened and sampled in place to minimize handling. However, when drums are stacked or are close together, they may have to be moved to prevent sympathetic detonation of, or chemical reaction with, other drums around the one being opened. The main criterion is distance to other drums--a reasonable distance should be maintained to keep the drum to be opened segregated from the others.

6.2.2 Leaking or Deteriorated Drums

The contents of drums that exhibit leakage or apparent deterioration such that movement will cause rupture (determined by the Site Safety and Health Officer (SSHO)) must immediately be transferred to a repack drum. Equipment, including transfer pumps used in the repack operation must be of explosion-proof construction.

Leaking drums containing sludge or semi-solids, drums that are structurally sound but which are open and contain liquid or solid waste, and drums which are deteriorated but can be moved without rupture must be placed in overpack containers. Make certain that representative samples are obtained from overpack drums. Sample the actual drum, not material that has leaked from the drum into the overpack.

6.2.3 Bulging Drums

Drums which potentially may be under internal pressure, as evidenced by bulging, must be sampled in place. Extreme care shall be exercised when working with and adjacent to potentially pressurized drums.

Should movement of a pressurized drum be unavoidable, handle only by a grappler unit constructed for explosive containment. The bulging drum should be moved only as far as necessary to allow seating on firm ground or it should be carefully overpacked.

6.3 Primary Staging of Drums

A staging configuration must allow the samplers reasonable access to each drum for inspection, sampling, and overpacking, if necessary, while economizing on space. Drums are staged in rows, two wide, with isle space between rows. According to the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, "In all staging areas, stage the drums two wide in two rows, per area, and space these rows 7 to 8 feet apart to enable movement of the drum handling equipment."

6.4 Drum Opening

Drum opening operations are completed by remote means prior to the collection of samples. This provides the sampler a means for collecting a sample in an otherwise sealed container.

6.4.1 Opening Area

When possible, the drum opening area should be physically separated from the drum removal and drum staging operations. When drums must be opened after they are already in a staging area, personnel should be a minimum of 50 feet from the drum opening area. When drum opening can be performed at an area other than the staging area, there should be adequate distance between the drum opening and the removal and staging operations to prevent a chain reaction or fire during the drum opening procedure.

6.4.2 Caterpillar 215 Grappler

Drum opening is normally accomplished with a Caterpillar 215 grappler using a brass-tipped punch. A remote drum punching unit may also be used on smaller drum projects. At all times the staging area should be clear of personnel on the ground during punching operations. Extreme caution should always be taken when drum punching/opening is being performed. AT NO TIMES SHOULD DRUMS BE PUNCHED MANUALLY BY HAND USING HAND HELD TOOLS!! Drums that have been placed inside overpack drums upside down will need to be punched to obtain sample(s) of both liquids in them and any settled solids.

6.4.3 Opening Specifications

Stone & Webster procedures prohibit the opening of drums containing unknown materials by hand. Employees found to be opening drums by hand will face disciplinary action. The drums will be opened by using a remote operated air punch or by the method described above.

Containers that are inside warehouses, basements, or other buildings should be moved outside before they are opened. Opening and sampling of containers inside a building should only be done when there are no areas outside of the building that could be safely or physically used for these purposes.

If it is determined that opening and sampling of containers must be done inside of a building, then the following minimum requirements must be met:

1) Adequate ventilation must be provided.

2) Containment must be in place around drum opening and sampling area.

3) A,B,C type fire extinguishers must be in place.

4) Sand and mechanized equipment for spreading the sand in case of a fire or reaction must be present.

6.5 Second Inspection

After the drums have been staged and opened, a second inspection of the drums is required. During the initial inspection, the drums would have been sealed and only inspection of the outside of the drums was possible. Since the drums are now open, visual observations of the drum contents will aid in locating drums that will require special handling.

Special handling techniques are required for containers which may expose personnel to particularly hazardous conditions. These techniques and techniques for recognition of special handling drums are described in general below, although site-specific conditions may require the development of specialized methods for handling of special handling drums.

6.5.1 Drums Containing Biohazards

A biohazard is defined by the Biohazards Committee of the American Industrial Hygiene Association (AIHA), as "an agent that is biological in nature, capable of self-reproduction, and has the capacity to produce deleterious effects upon other biological organisms, particularly humans." Biological agents are substances which could be biohazardous substances, but are not limited to the following:

- Infectious or parasitic agents
- Non-infectious microorganisms (such as some fungi, yeasts and algae)
- Plants and plant procedures
- Animals and animal products which can cause occupational disease

Recognition is the key to avoiding disease contaminated biological waste. Be aware that this may take the form of cultured animal cells, infected clinical specimens (tissues, fluids, etc.), or tissues from experimental animals (including animal dander). Open drums should be examined for evidence of biological material such as:

- Gauze
- Hypodermic Syringes
- Petri dishes
- Cultures
- Blood
- Animal tissues
- Waste from orthopedic casts (may be gray, crumbly solids resembling a type of insulation)

Biological waste that has been prepared for incineration or for autoclaving may be packaged in **red plastic bags** or may be contained in plastic bags that are marked with the universal biohazard symbol. Biohazards such as research bacterial cultures may be sent through the mail if they are packaged in a mailing tube. It is conceivable that either type of packaging could be found on a hazardous waste project.

If a biohazard or possible biohazard is identified, seal the drum and immediately notify the Site Safety Officer and the Project Superintendent.

6.5.2 Drums Containing Explosive or Shock Sensitive Waste

If drums containing wastes that have been identified by sampling, or are suspected by visual examination to be explosive in nature are found, the Project Manager and the SSHO must be notified immediately, before the drums are handled in any way.

If the Project Manager and the SSHO approve handling of these drums, they shall be handled with extreme caution. Initial handling shall be by a grappler unit constructed for explosive containment. Drums shall be palletized prior to transport to a high hazard interim storage and disposal area.

If at any time during remedial activities, an explosive, pursuant to provisions of Title 18, U.S. Code, Chapter 40 (Importation, Manufacturer, Distribution, and Storage of Explosive Materials, 1975 Explosives List) is identified, it should be secured and the appropriate state and federal agencies notified.

Identification of an explosive substance during the course of a remedial action is usually based on the experience of the on-site personnel. Potentially explosive materials usually may be identified by their physical characteristics such as texture, color density, etc. as well as by the way they are packaged. Most explosives are solids. In some cases they are packaged in water-tight containers to exclude water while in other cases they are packaged wet to preclude explosion.

Prior to handling or transporting drums containing explosive wastes, personnel working in the area shall be removed to a safe distance (as determined by the SSHO). Continuous contact with the communication bases shall be maintained until handling or transporting operations are complete. An audible siren signal system shall be used to signify the commencement and completion of explosive waste handling or transporting activities.

6.5.3 Drums Containing Radioactive Wastes

After the containers are opened, another radiological survey will be conducted. Drums containing radioactive wastes shall not be handled until radiation levels have been determined by a field survey which is recorded in a field notebook. The survey shall include background levels, direct gamma readings and laboratory analysis of drum surface wipe samples.

Depending on the level of radiation encountered, handling and transport may require special shielding devices to protect personnel. Following handling and transport, equipment used shall be surveyed by the SSHO and decontaminated to background levels prior to recommencing work. Surveys shall also be made of the ground surface in the vicinity of original drum storage to identify potential soil contamination by spilled or leaked radioactive waste. Prior to recommencing work in the area, radioactive soil areas shall be isolated to prevent tracking of radioactive contaminants about the site, and workers who entered the area should have their gloves and boots surveyed for radiation.

6.5.4 Packaged Laboratory Wastes (Laboratory Packs)

If drums known or suspected of containing discarded laboratory chemicals, reagents or other potentially dangerous materials in small volume, or individual containers are found, the Project Manager is to be notified immediately, before the drums or containers are moved or opened.

Lab pack drums are easily identified by the presence of vermiculite or other absorbent type packaging material. If a drum contains such material, there is a good possibility that the drum is a lab pack drum. Further investigation may reveal that the drum also contains smaller containers inside such as sample jars, metal shipping containers, specially sealed packages, or sealed 5 gallon buckets.

If the Project Manager and the SSHO approve the handling of these containers, they shall be handled with extreme caution. Until otherwise categorized, they shall be considered to be explosive or shock-sensitive wastes. Initial handling shall be by a grappler unit constructed for explosive containment. Drums shall be palletized and overpacked, if required, prior to transport to a staging area where sorting, identification, repackaging and/or stabilization can be done.

Prior to handling or transporting Laboratory Packs from the existing drum area, personnel working in the immediate area shall be removed to a safe distance. Continuous contact with the communications base shall be maintained until handling or transporting operations are complete. An audible siren signal system, similar to that employed in conventional blasting operations will be used to signify the commencement and cessation of Laboratory Pack handling or transporting activities.

6.5.5 Air Reactive Wastes

If the presence of an air reactive substance is verified or even suspected, the material should be immediately segregated and transported to a separate high hazard interim storage and disposal area.

Air reactive wastes may be discovered during opening or sampling operations. Air reactive substances are routinely packaged in special containers or packages that keep the material from making contact with the air. They may be stored under kerosene or some other liquid to minimize air contact. They may also be found in sealed ampoules, corrugated drums, stainless steel canisters, sealed aluminum containers, or specially lined drums.

6.6 Numbering and Mapping

Accurate numbering is critical. Mistakes in numbering, such as missing numbers or double numbering, are minimized by numbering <u>after</u> primary staging. To avoid problems, empty containers should be numbered and recorded on drum inventory logs as empty. DRUM NUMBERING SHOULD BE STRICTLY NUMERICAL.

Mistakes in numbering occur in most drum sampling projects. In large part, mistakes made have very little consequence until samples have been submitted to the laboratory. It is for this reason that drum numbering and drum mapping must occur before samples are collected.

After the drums in the staging area have been numbered, a drum map is made. The drum map is reviewed for double numbers and missing numbers. Any double numbered drums or missing numbers are corrected in the staging area and on the drum map before any sampling is to be performed in the staging area.

6.7 Sampling

Collection of samples should occur only after the procedures of the previous subsections have been followed. The following subsections describe collection of samples from drums which have been inspected, handled, staged, remotely opened, inspected a second time prior to sampling, and numbered.

All drums not in direct contact with ground surface and mechanical equipment should be grounded prior to the commencement of sampling. The reason for grounding of drums which are not in direct contact with ground surface is that a simple static electricity charge transferred to a drum which is not grounded, can cause an explosion or start a fire. A grounding rod driven into the ground surface, which is attached to copper wire, which is attached to a metal or copper clip, which is clipped to the drum being sampled is an acceptable method of grounding a drum.

6.7.1 General Sampling Procedures

Once the drum has been grounded, sampling of the drum can begin. The steps to be followed in sampling are as follows:

1) Remove the lid of the overpack container or remove the polyethylene sheeting from the top of the drum.

2) Record any markings, special drum conditions, and type of opening on the Drum Inventory Log.

3) Record the identifying number from the drum onto the Drum Inventory Log. Have a copy (reduced size if necessary) of the drum staging area map and double-check the drum number and location.

4) Use a PID (if weather permits) and an LEL meter to collect air monitoring readings from the drum. Record the results on the Drum Inventory Log.

5) Insert glass tubing almost to the bottom of the drum or until a solid layer is encountered. About one foot of tubing should extend above the drum.

6) Allow the waste in the drum to reach its natural level in the tube. Cap the top of the sampling tube using a thumb or forefinger

7) Carefully remove the capped tube from the drum and insert the uncapped end in the sample container. Release thumb or forefinger from tube and allow the glass thief to drain completely into the sample container.

8) Repeat steps 6 & 7 until the required sample volume has been collected.

9) Place the used sampling tube, along with paper towels or waste rags (used to clean up any spills), into an empty metal barrel marked "sampling waste" for subsequent disposal.

10) Close the sampling container cover tightly, wipe off with a paper towel and place a label on the sample container.

11) Replace the overpack lid or place a plastic cover over the drum/container.

12) Measure the sample for radioactivity and record results on the Drum Inventory Log.

13) Fill out Chain-of-Custody Record and carefully package samples in accordance with Stone & Webster's Labeling Packaging and Shipping Environmental Samples SOP.

14) Complete the appropriate shipping forms. Drum samples are always considered to be high-hazard samples.

6.7.2 Sampling Solids and Semisolids

Solids in drums are sampled by scooping the material up with the use of tongue depressors. All reasonable efforts shall be made to obtain sample to a depth of 12 inches or refusal. It is sometimes necessary to sample the material with the use of a trier. This sampling device is often not used however, due to the substantial increase in time necessary to obtain the trier. Tongue depressors will be disposed after each use. Nonexpendable sampling tools must be decontaminated between drums. Sometimes, the material must first be broken up with a non-sparking hammer or hammer and chisel (NOTE: This is the only time in which a sampler is allowed to have a hammer or chisel in their hands), or, for rubber-like solids, a piece may need to be cut off with a knife.

6.7.3 Sampling Solids Underneath Liquids

Sludge or solids underneath a liquid may be sampled by forcing the pipette into the drum. If the sludge does not run out into the jar, whacking the pipette or tapping it against the side of the bottle may loosen the sample. If this fails, one may break the pipette and put the pieces which have the solid in them in the bottle.

When pipettes are used for sampling, samplers must wear Whizard glove liners (stainless steel mesh glove liners designed to prevent cuts which could be caused by sharp objects such as broken glass tubing).

6.7.4 Materials Between Drum and Overpack

In many drum sampling projects where drums have been overpacked, it is typical to find liquids or solids between the drum and the overpack in which it is contained. Sometimes these materials have the same appearance and matrix as the material inside of the drum itself, although they may be quite different than the material inside the drum.

6.7.4.1 Solids

Solids may appear in an overpack, between the drum and the overpack, that are different than the solids or liquids in the drum itself. If these solids appear to be in soil, then a notation must be made on the Drum Inventory Log that the material exists between the drum and the overpack. This material does not need to be sampled. If these solids appear to be something other than soil, then this material must be sampled in accordance with Sampling Solids and Semisolids. In addition, a notation that the material exists between the drum and the overpack must be made on the Drum Inventory Log.

6.7.4.2 Liquids

Liquids may appear in an overpack, between the drum and the overpack, that are different from the solids or liquids in the drum itself. This material must be sampled in accordance with Sampling Procedures. In addition, a notation that the material exists between the drum and the overpack must be made on the Drum Inventory Log.

6.7.4.3 Sampling Frozen Drums

Stone and Webster may be faced with the need to collect samples in conditions where the temperature is below 32° F (0° C) and the material inside the drum is partially or completely frozen. In situations where the material in the drum is frozen, a Milwaukee wood bit with an air driven drill or hand drill is used (with the Milwaukee wood bit) to drill, or auger through the frozen material. Every few inches of augering, the bit is removed and the shavings are placed into the appropriate sample container(s). This procedure is repeated until a sufficient volume of the material has been obtained. Care must be taken to insure that a hole is not drilled through the bottom of the drum.

6.7.5 Post-Sampling Procedures

After the sample has been taken, the outside of the bottle will be wiped off and labeled with the drum number. The drum number will also be written on the lid of the bottle. All sampling data and observations will be recorded on the drum inspection log.

After a group of drums have been sampled, the samples will be collected. The sampling trash, sample gloves, paper towels, etc., will be collected and placed into a drum marked "sampling waste" for disposal. The sampling pipettes will also be collected and packaged in the sampling waste drum for disposal.

All openings shall be plugged except during sampling operation. The reason for this is to prevent rainwater from entering the drum before or after sampling has been performed. For drums which are in overpack containers, this is simply having the lid on the overpack container. For drums which are not in overpack containers, this can be accomplished by placing polyethylene sheeting over the top of the drum in a manner that will keep rainwater from entering the drum.

6.8 Drum Inventory Log

The field data gathered during the drum sampling activities will be recorded on a Maywood Project Drum Inventory Log sheet. The following is a list of the information necessary to complete the form

1) Drum Number - Number only; at least 3 digits in length (001).

2) Site Number - Assigned by Stone & Webster to each site on the project.

3) Page - of - If Material Safety Data Sheets (MSDS) or other information, then the total number of pages accompany the drum log is required. Mostly it will be page 1 of 1.

4) Site Location - Name assigned by Stone & Webster to each site on the project

5) Project Superintendent or designee - see Section 5.4.

6) Phone - Site phone or number of the supporting Stone & Webster office.

7) Logger - Name of individual responsible for filing in the sampling portion of the Drum Inventory Log.

8) Sampler - Name of individual(s) responsible for obtaining the sample

9) Weather - Weather conditions during sampling (e.g., temperature and/or precipitation).

10) Date - Date when sample was collected.

11) Time - Time when sample was collected.

12) Drum Type – Indicate the drum type and materials of construction.

13) Lid Type – Indicate the type of closure on the container.

14) Drum Condition – Describe the integrity of the drum. State "Meets DOT specifications" if the drum can be shipped according to Department of Transportation (DOT) regulations.

15) Drum Size - Provide the volume of drum when full. If the drum is overpacked, the inner drum volume should be indicated, not the size of the overpack.

16) Drum Contents - Provide the volume of waste contained in the drum.

17) Overpacked - Indicate if the container was overpacked, and state the type of overpack utilized.

18) Layers - Designates the layer as top, middle or bottom for a multi-layered sample. If only one layer exists, complete only the line associated with the top layer, "T".

19) Physical State – Indicate the actual physical state of each layer.

20) Color – A standard color description for each layer of the sample should be written in.

21) Clarity - Indicate the clarity of each layer of the sample.

22) Layer Thickness - Record the thickness of each layer in inches; an estimate of how deep the layer is.

23) pH - Record pH measurement in standard units (SU); 0 to 14 or the designation "N/A" if there was no measurement obtained.

24) PID - Record the results for vapor analysis by photoionization detector (PID) or the designation "N/A" if there was no measurement obtained. The PID scale reads in ppm (0 to 2,000).

25) Dosimeter - The results of the field radiation survey is recorded in this space or the designation "N/A" if there was no measurement obtained. The dosimeter's scale units are in millirems per hour (mr/hr or mrem/hr).

26) Other - This space is for additional analysis which may take place or the designation "N/A" if there were no other measurements. The information should include the equipment used, the parameter being measured, and its concentration. Example: Drager tube - HCN - 5 ppm.

27) DOT Haz - Hazard category from placards or stencils on drum. Example: Corrosive Liquid.

28) UN/NA - Space for any UN or NA numbers which are stenciled or written on the drum. These numbers are always fixed by either UN or NA.

29) MFG Name - Name, address, and telephone number of the company producing or distributing the chemical/product. If the space provided is

inadequate, indicate that the information continues on the back of the log, and do so.

30) Chemical Name - Any chemical or compound, key ingredient, trade name, and/or chemical name of the contents on the label or stenciled on the drum. Indicate whether the information was printed on a label or stenciled or handwritten on the drum. If the space provided is inadequate, indicate that the information continues on the back of the log, and do so.

31) Additional Information - This space is for additional information or comments for which no specific space is designated. It can include unusual comments or problems such as the contents are too hard to sample, drum color, or that colored crystals have formed on the drum. If the space provided is inadequate, indicate that the information continues on the back of the log.

6.9 Sample Preservation and Packing Procedures for Drummed Waste Samples

- No preservatives shall be used.
- Place sample in a zip-lock plastic bag. (If sample is liquid, place bottle in plastic bag)
- Place each bagged container in a covered metal can containing absorbent packing material
- Mark the sample identification number on the outside of the can.
- Arrange for the appropriate transportation mode consistent with the type of hazardous waste involved. Depending on mode of transportation and type of material being transported, additional packaging requirements may apply.
- In general follow the procedures given in Stone & Webster's Labeling, Packaging and Shipping Environmental Samples SOP.

6.10 Decontamination Procedures

All sampling equipment used in obtaining samples from containers will be either dedicated (disposable) or pre-cleaned and decontaminated. For detailed guidance in decontamination procedures, refer to Stone & Webster's Decontamination SOP.

1) Thoroughly scrub with a brush using a detergent (Alconox) and hot water solution to remove large particles.

2) Thoroughly rinse the detergent solution off the equipment with tap water.

3) Rinse the equipment with deionized water.

4) Solvent rinse the equipment with pesticide grade isopropanol.

5) Solvent rinse the equipment with pesticide grade hexane.

6) Air dry the equipment before use.

6.11 Resealing and Secondary Staging

All containers opened for sampling need to be resealed to prevent the escape of vapors and possible reactions with rainwater and air. The resealing methods will depend on the opening methods used and include the following:

- Replacing the lid and retaining ring.

- Placing the drum in an overpack (larger drum) when it cannot be resealed by any other method.

- Placing polyethylene sheeting over the drum in a manner that prevents rainwater from entering the drum. The sheeting should be secured to prevent it being blown off by the wind.

It is important to note that these resealing methods are for the purpose of preventing leakage from the container while it is in storage on the site. If the container is to be moved off the site, DOT regulations regarding transportation and sealing of drums will apply.

Once the drum is sampled and resealed, it should be left where it cannot react with other containers on the site. For a small number of drums, the storage areas may be the staging and opening area. In any event, the sampled drums should be placed in an area away from other groups of containers on the site. The reason is that slowly progressing chemical reactions can start when a container is opened and the contents exposed to air or the disturbance caused by handling the drum. Such a reaction could take hours or even days to occur.

Another reason for the segregation and identification of drums for recovery is for use as evidence and as an indication of which drums have been sampled.

6.12 Sample Control

The Project Chemist or his/her representative on-site is responsible for the identification, preservation, packaging, handling, shipping, and storage of samples obtained from the site. For detailed guidance in these procedures, refer to Stone & Webster's Labeling, Packaging, and Shipping Environmental Samples SOP.

7.0 CHARACTERIZATION AND TEST BLENDING

A waste blending test is used to determine if the drums included in a waste stream are truly compatible. Whether the wastes are to be blended on site or to be sent in drums to a disposal facility, a waste blending test must be performed for waste profile purposes. Waste blending is usually performed by the on-site Chemist.

Samples of the blended waste to be sent off-site for laboratory analysis for disposal parameters will be shipped by the following procedures and by the procedures listed in Stone & Webster's Labeling, Packaging, and Shipping Environmental Samples SOP.

1) The lids of the sample jars will be tight and sealed with tape.

2) The sample container will be placed inside two 4-mil plastic, protective bags.

3) The sealed sample will be placed in a metal paint can.

4) The samples will be placed into a cooler and packed with blue ice to maintain their temperature at 4 degrees Celsius.

5) Bubble pack or other insulating packing material will be placed into empty spaces in the cooler.

6) The cooler will be sealed, addressed, identified, and placarded according to the nature of the hazards associated with the materials being shipped.

8.0 EQUIPMENT

The equipment listed below will normally be required to accomplish drum sampling on a project site.

- Spill Control Kit
- Remote controlled drum opening equipment - pneumatic, hydraulic or other
- LEL/O_2 meter (MSA Model 260/360)
- HNU portable organic vapor analyzer (Model HW - 101)
- Fire extinguisher, Class A, B and C, size as per Health & Safety Plan requirements
- Radiation survey meter, internal GM detectors (Ludlum Model 5, P/N 48 - 1607)
- Personal protective equipment. This may include: robar or Tingley boots, Tyvek and/or saran protective suit with hood, acid jacket and pants, vinyl booties, vinyl sample gloves, nitrile outer gloves, hard hat with splash shield and respirators.
- Rolls of plastic sheeting (Visqueen)
- Sampling Equipment
- Equipment and supplies needed for drum sampling (per 100 drums)

◊ 120 drum log sheets
◊ 120 8oz jars with Teflon lined lids
◊ 200 tongue depressors
◊ 120 11mm dip tubes
◊ 400 pair sample gloves
◊ 5 mean streaks
◊ 4 rolls of paper towels
◊ 2 30 gal. Polyethylene trash bags
◊ 12 chain-of-custody forms
◊ 4 Liters of isopropanol
◊ 4 Liters of hexane (Pesticide grade)

- Equipment and supplies generally needed per drum job

◊ 1 12-column book
◊ 2 Stone & Webster record books
◊ 1 knife, beryllium copper (BeCu)
◊ 1 bung wrench, Ampco metal
◊ 1 screwdriver, beryllium copper
◊ 1 scraper, beryllium copper

- ◊ 1 hammer, claw, BeCu alloy
- ◊ 1 chisel, Ampco metal, 1" wide
- ◊ 2 pairs cut-proof glove liners
- ◊ (2) 15/16" sockets, BeCu alloy
- ◊ (2) ½" drive ratchets, BeCu alloy
- ◊ (1) 1 ¼" x 18"L wood boring bit
- ◊ (1) ½" air powered drill, low RPM
- ◊ 1 tool box, polyethylene with lock
- ◊ 2 wash bottles, isopropanol
- ◊ 2 wash bottles, hexane
- ◊ 2 wash bottles, acetone
- ◊ 1 H_2S monitox with gas generator
- ◊ 1 HCN monitox with gas generator

- Source of pressurized air (100 psi and 8 CFM) and air hoses for air drill and remote pneumatic drum punch.

Field Audits

SW-MWD-501-0

STANDARD OPERATING PROCEDURE FUSRAP MAYWOOD SUPERFUND SITE STONE & WEBSTER ENGINEERING CORPORATION		
TITLE: Conducting Field Audits	NO.:	SW-MWD-501-0
	PAGE	1 of 11
	DATE:	May 1999
APPROVED: Project Manager Project Engineer		

1.0 PURPOSE

This field audit procedure is to be used for the auditing of field sampling events to verify adherence to the field sampling plan (FSP) and to document any deviations from prescribed procedures. A field audit is the verification of a sampling team's performance during a sampling episode.

2.0 SCOPE

This guideline is to provide general reference information on the aspects of performing a field audit at the FUSRAP Maywood Superfund Site. (Note: In most cases the auditor will be the Contractor Quality Control System Manager (CQCSM), however this SOP has been prepared for any Auditor to use.)

These limitations apply to all field audits during any sampling event excepting requirements of project-specific plans for field audits.

3.0 REFERENCES

U.S. EPA Region II CERCLA Quality Assurance Manual. Part II, Quality Control Handbook for CERCLA Sampling and Analysis, Section XV. October 1989, Rev. 1.

N.J. Department of Environmental Protection - Field Sampling Procedures Manual. February 1988.

4.0 DEFINITIONS

None

5.0 RESPONSIBILITIES

5.1 Project Manager

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified to perform field audits.

5.2 Project Engineer

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the auditor has been properly briefed and is prepared for conducting field audit tasks.

5.3 Site Safety and Health Officer

All field activities must be carried out in accordance with a site-specific SSHP. The Site Safety and Health Officer is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.4 Project Superintendent

The Project Superintendent is the individual designated by the project manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed on conducting field audits in accordance with the project requirements, this SOP, and related SOPs. He or she assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin, and that all necessary personnel are mobilized on time. The Project Superintendent maintains a daily log of activities each work day.

6.0 PROCEDURE

A copy of the approved work plan should be reviewed by the auditor prior to going in the field. The auditor should be familiar with the number of samples, parameters, sampling methodology, decontamination procedures, etc. to be utilized at the site prior to performing the field audit.

The auditor should review the Site Safety and Health Plan and be prepared for the level of personnel protection specified in the task-specific work plan. This means that the auditor should have the necessary PPE equipment available for use in his or her vehicle prior to going in the field.

It is recommended that prior to performing a field audit, the auditor will contact the Project Manager and discuss the audit. This type of pre-sampling conference with the project manager has proven to be an effective tool to ensure proper preparation, for the sampling event, has in fact occurred. This will avoid project delays and time wasted by staff auditors.

If the sampling episode is going to occur over an extended period of time, the auditor should specify the dates they wish to be on-site to witness sample collection. In addition, directions to the sampling location should be obtained.

The auditor should verify the sample matrix and equipment that the sampling team plans to use. If necessary, discuss the sampling technique to be utilized with the Project Manager or Project Chemist in the event that last minute substitutions might occur. If this situation arises, the auditor must evaluate if the changes proposed will compromise the objectives of the task-specific Field Sampling Plan (FSP) and if necessary, advise the project management team of potential delays.

6.1 Document References in the Field

The auditor should have the following documents available for reference in the field when performing quality control field audits:

1. Copy of the approved work plan and any relevant memos, correspondence or addenda.

2. Copy of the pertinent field sampling procedures and/or the USEPA Groundwater Monitoring Technical Enforcement Guidance Document.

3. Appropriate bound field log book (in an 8 x 11 format).

4. Appropriate field audit checklist

5. List of telephone numbers for project personnel and emergency numbers.

6. Camera (optional)

Note: The field audit checklist should be 100% complete prior to leaving the site where the sampling event has occurred.

6.2 Corrective Action in the Field

Besides observing and reporting, the auditor is responsible for initiating steps for the start-up of corrective action procedures.

If the auditor witnesses discrepancies in the field between the approved work plan and the performance of the sampling team, then the auditor has several options available for corrective action. These options are dependent upon the type of infraction observed.

Infractions observed and the corrective action taken must be documented in the auditor's logbook.

6.3 Types of Infractions

(Definition: Any deviation from the procedures described in the approved work plans or SOPs being audited.)

o Minor Infractions

Minor infractions are problems that are observed by the auditor and immediately brought to the attention of the party conducting the investigation. The auditor and the party conducting the investigation should discuss the problem and agree upon what corrective action is necessary. This will allow for the infractions to be corrected immediately in the field.

Impact, if any, to the data generated can be easily eliminated and procedures can be corrected and/or repeated to achieve the desired result.

Examples of minor infractions would include: not wearing disposable gloves, insufficient well evacuation, and not filling volatile organic sample containers completely.

o Major Infraction

Major infractions are events or procedures that substantially deviate from approved work plans, administrative documents, the USEPA Groundwater Monitoring Technical Enforcement Guidance Document, or will otherwise result in increased project costs not previously approved.

Upon witnessing a major infraction which would cause work to cease, the auditor shall inform the party conducting the investigation of the problem. They should then discuss what steps are necessary for corrective action. During this time all work on site should stop until a resolution is agreed upon.

If the party conducting the investigations refuses to cease work or take the necessary steps for corrective action, then the auditor shall inform the party that samples obtained will potentially cause data critical to the environmental evaluation of a project to be qualified or become suspect. This type of infraction has the potential to cause total or partial rejection of samples submitted to the laboratory.

Examples of major infractions would include: no trip or field blanks, improper decontamination procedures, and change in sampling location and procedures.

When infractions are observed, the results of the audit should be immediately communicated in writing to the Project Quality Control Manager.

6.4 Preparation of a Field Audit Report

The quality control field audit report provides a means of relaying the events of a sampling episode to key personnel. These events could possibly affect the sample integrity (QA/QC) and therefore they are important to the decisions that are made in regards to analytical data.

A quality control field audit report will usually contain the following information.

1. Date and location of field audit
2. Sample matrices witnessed

3. Name of personnel conducting the sampling
4. Summary of sample methodology
5. Description of any infractions that occurred and the corrective actions taken.
6. Conclusions
7. Recommendations
8. Map of sample locations
9. Table of samples witnessed by the auditor
10. Quality control field audit checklist (refer to attachments)

8.0 ATTACHMENTS

Quality Control Field Audit Report

QUALITY CONTROL FIELD AUDIT REPORT

SUMMARY INFORMATION

1. PROJECT NAME: ______________________________

2. PROJECT ADDRESS ______________________________

____

3. PRELIMINARY ASSESSMENT ____ RI/FS ____ RD ____ CONSTRUCTION ____

OTHER ______________________________

4. DATE(S) OF QC FIELD AUDIT ______________________________

5. AUDITOR'S NAME ______________________________ PHONE ______________

6. FACILITY CONTACT ______________________________ PHONE ______________

7. CONTRACTOR CONTACT ______________________________ PHONE ______________

8. PERSONNEL ON-SITE

NAME	REPRESENTING	PHONE

9. AUDITOR'S COMMENTS. ______________________________

____

____

10 WEATHER CONDITIONS

SUNNY PARTLY SUNNY PARTLY CLOUDY CLOUDY RAIN DRIZZLE SNOW SLEET

TEMPERATURE ________ WIND SPEED ________ WIND DIRECTION ________

11 LEVEL OF PERSONNEL PROTECTION REQUIRED IN WORK PLAN LEVEL OF PERSONNEL PROTECTION ACTUALLY DONNED

A B C D A B C D

12 FIELD SURVEY EQUIPMENT:

INSTRUMENT	MODEL	CALIBRATION CHECK	CALIBRATION STANDARD SETTING	SPAN
CONDUCTIVITY METER	________	________	________	________
DISSOLVED OXYGEN METER	________	________	________	________
pH METER	________	________	________	________
COMBUSTIBLE GAS INDICATOR (LEL/O_2)	________	________	________	________
FLAME IONIZATION DETECTOR (OVA)	________	________	________	________
PHOTOIONIZATION DETECTOR (HNU)	________	________	________	________
TOTAL GAS INDICATOR (CO, H_2S)	________	________	________	________
OTHER	________	________	________	________

OBSERVATIONS ____

____

13 DID THE SAMPLING TEAM TAKE PERIODIC SURVEYS OF THE AMBIENT AIR CONDITIONS? YES NO N/A

14 DID THE SAMPLING TEAM PROVIDE A DECON ZONE DESIGNATING CLEAN AND CONTAMINATED AREAS? YES NO N/A

15 WERE PHOTOGRAPHS TAKEN? YES NO

16 AUDITOR'S COMMENTS: ____

____

____

MONITORING WELL SAMPLING SETUP AND EVACUATION

EVACUATION PROCEDURES

1. WELL CASING CONSTRUCTION   STAINLESS STEEL   TEFLON   PVC   OTHER ________

2. DIAMETER OF WELL CASING   2"   4"   6"   OTHER ________

3. LOCKING CAPS ON THE WELLS   YES   NO   N/A   PROTECTIVE CASING   YES   NO   N/A

4. METHOD UTILIZED TO DETERMINE THE STATIC WATER LEVEL   WATER LEVEL INDICATOR   OTHER ____________

5. REFERENCE POINT THAT THE STATIC WATER LEVEL WAS MEASURED FROM:

   SURVEY POINT   TOP OF INNER CASING   TOP OF PROTECTIVE CASING   HEIGHT OF CASING ABOVE GROUND SURFACE

6. WAS THE WATER LEVEL INDICATOR DECONTAMINATED ACCORDING TO STANDARD PROCEDURES BETWEEN EACH WELL?:

   YES   NO   N/A

IF NO, METHOD UTILIZED ____

____

7. EVACUATION METHOD:

   BAILER   CENTRIFUGAL PUMP   PERISTALTIC PUMP   BLADDER PUMP   SUBMERSIBLE PUMP

   GAS DISPLACEMENT PUMP   GAS LIFT PUMP   OTHER ________________________

8. TYPE OF HOSE UTILIZED:

   POLYETHYLENE (ASTM DRINKING WATER GRADE 2239)   TEFLON   SILASTIC   N/A

   OTHER ____

9. WAS THE HOSE DEDICATED TO EACH WELL LOCATION?:   YES   NO   N/A

   IF NO, METHOD OF DECONTAMINATION ________________________________

10. WAS THE PUMP DEDICATED TO EACH WELL LOCATION?:   YES   NO   N/A

11. WAS THE PUMP: LABORATORY DECONTAMINATED   FIELD DECONTAMINATED   N/A

12. WAS THE PUMP DECONTAMINATED ACCORDING TO STANDARD CERCLA PROCEDURES?:   YES   NO

   IF NO, METHOD OF DECONTAMINATION ________________________________

13. WAS THE PUMP HEAD OR END OF HOSE WITHIN 6 FEET OF THE DYNAMIC WATER LEVEL DURING EVACUATION?:

   YES   NO   N/A

14. WAS THE DECONTAMINATION AREA LOCATED AWAY FROM THE SOURCE OF CONTAMINATION?:   YES   NO   N/A

15. AUDITOR'S COMMENTS: ____

____

AQUEOUS SAMPLING PROCEDURES

1. AQUEOUS MATRIX SAMPLED.

    POTABLE WELL GROUNDWATER SURFACE WATER LEACHATE RUNOFF STORM SEWER

    SANITARY SEWER OTHER: ______________________

2. TYPE OF SAMPLE. GRAB COMPOSITE IF COMPOSITE, # SAMPLES/COMPOSITE ______________

3. WAS THE VOA SAMPLE COLLECTED FIRST: YES NO N/A

4. TYPE OF SAMPLING EQUIPMENT:

	MATERIAL OF CONSTRUCTION			
	STAINLESS STEEL	TEFLON	GLASS	OTHER
BAILER	______	______	______	______
BLADDER PUMP	______	______	______	______
SAMPLER	______	______	______	______
COLIWASA	______	______	______	______
KEMMERER DEPTH SAMPLER	______	______	______	______
WHEATON DIP SAMPLER	______	______	______	______
TUB SAMPLER	______	______	______	______
BACON BOMB	______	______	______	______

5. TYPE OF LEADER LINE THAT COMES IN CONTACT WITH THE WELL WATER.

    TEFLON TEFLON-COATED STAINLESS STEEL N/A OTHER ______________

6. LENGTH OF THE LEADER LINE: ______________________

7. WAS THE SAMPLING EQUIPMENT DEDICATED?: YES ______________ NO ______________

8. WAS THE SAMPLING EQUIPMENT: LAB DECONTAMINATED FIELD DECONTAMINATED

9. WAS THE SAMPLING EQUIPMENT DECONTAMINATED ACCORDING TO STANDARD PROCEDURES? YES NO

    IF NO, METHOD OF DECONTAMINATION: ______________________

10. WAS THE DECONTAMINATION AREA LOCATED AWAY FROM THE SOURCE OF CONTAMINATION?: YES NO N/A

11. ARE DISPOSABLE GLOVES WORN AND CHANGED BETWEEN EACH SAMPLE LOCATION?: YES NO

12. AUDITOR'S COMMENTS: ______________________

NON-AQUEOUS SAMPLE INFORMATION

1 NON-AQUEOUS MATRIX SAMPLED

SOIL SEDIMENT SLUDGE CHEMICAL SOLIDS WASTE PILE

OTHER ______

2 TYPE OF SAMPLE GRAB COMPOSITE IF COMPOSITE, # SAMPLES/COMPOSITE ______

3 WAS THE VOA SAMPLE COLLECTED FIRST FROM A DISCRETE LOCATION PRIOR TO HOMOGENIZATION?: YES NO N/A

4 WAS THE SAMPLE HOMOGENIZED PRIOR TO ACQUISITION INTO THE SAMPLE CONTAINERS?: YES NO

5 TYPE OF SAMPLING EQUIPMENT

	MATERIAL OF CONSTRUCTION			
	STAINLESS STEEL	TEFLON	GLASS	OTHER
SPOON/SPATULA	______	______	______	______
TROWEL/SCOOP	______	______	______	______
BUCKET AUGER	______	______	______	______
SPLIT SPOON	______	______	______	______
SHELBY TUBE	______	______	______	______
TRIER	______	______	______	______
PONAR DREDGE	______	______	______	______

6 WAS THE DRILL RIG, AUGER FLIGHTS, RODS, ETC. DECONTAMINATED ACCORDING TO STANDARD PROCEDURE BETWEEN EACH SAMPLE LOCATION?
YES NO N/A

IF NO, METHOD OF DECONTAMINATION ______

7 IF MUD ROTARY DRILLING WAS UTILIZED WHAT WAS THE SOURCE OF THE WATER?: ______

8 WAS THE SAMPLING EQUIPMENT DEDICATED?: YES ______ NO ______

9 WAS THE SAMPLING EQUIPMENT: LAB DECONTAMINATED FIELD DECONTAMINATED

10 WAS THE SAMPLING EQUIPMENT DECONTAMINATED ACCORDING TO STANDARD PROCEDURES?: YES NO

IF NO, METHOD OF DECONTAMINATION: ______

11 WAS THE DECONTAMINATION AREA LOCATED AWAY FROM THE SOURCE OF CONTAMINATION?: YES NO N/A

12 ARE DISPOSABLE GLOVES WORN AND CHANGED BETWEEN EACH SAMPLE LOCATION?: YES NO

13 AUDITOR'S COMMENTS ______

QA/QC INFORMATION

1. LABORATORIES:

    NAME ______________________ PHONE ______________

    NAME ______________________ PHONE ______________

    CONTACT PERSON ______________________

    CLP   CLP CAPABLE   CERTIFIED   OTHER ______________

2. SAMPLE INFORMATION:

MATRIX	PARAMETER	PRESERVATIVE	CONTAINER DESCRIPTION
______	______	______	______
______	______	______	______
______	______	______	______
______	______	______	______
______	______	______	______
______	______	______	______
______	______	______	______

3. WHAT ORDER, BY ANALYTICAL PARAMETER, ARE SAMPLES COLLECTED: ______________

4. FIELD BLANKS: YES   NO   N/A   FREQUENCY ______________

    METHOD: ______________________

    WAS IDENTICAL BOTTLE TO BOTTLE TRANSFER OF WATER UTILIZED?:   YES   NO

5. TRIP BLANKS: YES   NO   N/A   FREQUENCY ______________

6. WHAT WAS THE SOURCE OF THE BLANK WATER?:   LABORATORY DEMONSTRATED ANALYTE-FREE   OTHER ______________

7. SAMPLE PACKAGING AND HANDLING:

    SAMPLE CONTAINERS LABELED   YES   NO   N/A

    COC FORMS COMPLETED   YES   NO   N/A

    CUSTODY SEALS   YES   NO   N/A

    SAMPLES PRESERVED TO 4°C: YES   NO   N/A

8. AUDITOR'S COMMENTS:

Overburden Drilling Methods

SW-MWD-503-0

STANDARD OPERATING PROCEDURE **FUSRAP MAYWOOD SUPERFUND SITE** **STONE & WEBSTER ENGINEERING CORPORATION**		
TITLE: **Overburden Drilling Methods**	**NO.:**	SW-MWD-503-0
	PAGE	1 of 23 plus attachments
	DATE:	August 1999
APPROVED: ________________ Project Manager ________________ Project Engineer		

1.0 PURPOSE

This Standard Operating Procedure S&W SOP - **Overburden Drilling Methods** is to be employed when drilling through overburden materials at Maywood site properties with known or suspected soil and/or groundwater contamination at the FUSRAP Maywood Superfund site.

2.0 SCOPE

This procedure details the materials, equipment, and methods common to Overburden Drilling activities. Consult the site-specific project plans for proposed boring locations and special drilling techniques. Always consult state-specific or program-specific requirements as well as manufacturer's instructions for equipment use to ensure compatibility of this SOP with project requirements. **Field changes to this SOP shall be discussed with the Project Superintendent prior to implementation and shall be documented in project field logbooks.**

3.0 REFERENCES

Atlas Copco - Sandrik Rock Tool Catalog: Sweden.

Boart Longyear Company, Sonic Drilling, Environmental Drilling Division, Catalog, Revision 1.

Hix, G. L., Casing advancement methods for drilling monitoring wells, WWJ, May, 1991, p. 60-64.

Keely, J. F., and Kwasi Boateng, Monitoring well installation, purging, and sampling techniques - Part 1: Conceptualizations, Ground Water, v. 25, no.3, 1987, pp. 300-313.

Stone & Webster (S&W) SOP 506 - Decontamination

Stone & Webster (S&W) SOP 308 - Soil Borings and Sampling

S&W SOP 203 - Rock Coring

S&W SOP 307 – Surface and Shallow Subsurface Soil Sampling

S&W SOP 504 - Labeling, Packaging, and Shipping Environmental Samples

S&W SOP 303 - Monitoring Well Installation & Development

S&W SOP 505 – Cuttings and Fluids Management

United States Army Corps of Engineers, Monitor Well Design, Installation, and Documentation at Hazardous and/or Toxic Waste Sites, Engineering Manual 1110-4000, August, 1994.

U.S.E.P.A, A Compendium of Superfund Field Operation Methods, Document EPA/540/P-87/001, December, 1987.

4.0 DEFINITIONS

None

5.0 RESPONSIBILITIES

Project Manager - Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified for the needed work.

Project Environmental Engineer - Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for overburden drilling activities.

Project Superintendent - The Project Superintendent is individual designated by the Project Manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed in monitoring overburden drilling activities in accordance with the project requirements, this SOP and related SOPs. The Project Superintendent assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin. The Project Superintendent assures that all necessary personnel are mobilized on time and maintains a daily log of activities each work day. The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected occurrences during overburden drilling activities and deviation from this SOP.

Site Personnel - All employees who are engaging in overburden drilling activities are required to read and sign Maywood Site Safety and Health Plan (SSHP) and to follow the procedures in this SOP, unless superseded by project-specific requirements. All overburden drilling activities, including deviations to this SOP, will be recorded in field logbooks during on-site activities.

Site Safety & Health Officer - All field activities must be carried out in accordance with a Maywood Site Safety and Health Plan (SSHP). The Site Safety and Health Officer (who may also serve as an observer of overburden drilling activities) is responsible for ensuring that all site workers (Stone &

Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

6.0 GENERAL EQUIPMENT & MATERIAL REQUIREMENTS FOR OVERBURDEN DRILLING

The following is a list of equipment & material which is commonly used on all projects when exploration drilling is performed in the overburden. Refer also to related SOP equipment and material requirements to ensure completeness. Sampling methods for soil and rock are not described in this SOP.

Items required by subcontractor:

- Drilling Machine - of appropriate size and drilling and sampling capabilities. Provided by subcontractor. See Section 7 for information on choosing drilling method
- Drilling tools used to advance boring (i.e., drill rods and augers)
- Drilling tools that support the borehole walls while advancing hole (i.e., drill casing and augers)
- Fluid Pump - capable of delivering sufficient volume and pressure for the diameter and depth of hole to be drilled.
- Environmentally-safe lubricants
- Adequate supply of clean drilling water (water tanks filled prior to start time)
- Cement/bentonite supply for grouting
- Suitable grout mixers and grout pumps
- Soil sample collection and logging supplies - **See S&W SOP - Soil Borings and Sampling**
- Rock coring and rock core logging supplies - **See S&W SOP - Rock Coring**
- Empty, clean 55 gallon drums with sealable covers, if required

- **Items carried by S&W on-site personnel**

- Site Safety and Health Plan (SSHP). **To be read and signed by all site personnel prior to site activities.**
- Personal Protective Equipment
- Field logbook(s)
- Clipboard
- Pencils
- Six-foot-ruler
- Pocket knife
- Camera (optional), check with Project Manager if required
- Volatile organic compound vapor meter
- Site boring logs
- Blank boring logs
- Decontamination supplies - **See S&W SOP - Decontamination and FSP**

- Weighted measuring tape
- Water level measuring device - **See S&W SOP - Groundwater Level Measurement,** Interface probe, if needed
- Paper towels

7.0 PRE-DRILLING ACTIVITIES AND OVERBURDEN DRILLING ACTIVITIES

7.1 General Considerations

Prior to selecting the drilling method for a specific project, the objectives of the field investigation program must be established. The program objectives may include any or all of the following:

- Soil or rock evaluation - If undisturbed or representative samples are required, the drilling technique must be able to accommodate the appropriate type of sample collection.

- Characterization of hydrogeologic conditions - the drilling technique should allow for the characterization of each stratigraphic zone, water level measurements, and water collection.

- Evaluation of soil or ground water contamination - the drilling technique must provide the appropriate sample collection methods, must not introduce contaminants into the borehole or otherwise alter the existing soil or groundwater chemistry, and should not result in subsurface cross contamination during or after drilling.

- Installation of monitoring wells - the drilling method must permit appropriate well construction and minimize the disturbance to both the borehole and the well.

One of the best resources for selecting an appropriate drilling technique is an experienced drilling contractor. Items that should be considered in the drilling method selection process include the following:

- Geologic Conditions:

  - Number of holes to be drilled
  - Unconsolidated or consolidated
  - type of material, including fill material
  - presence of boulders or cobbles
  - depth to bedrock if bedrock is to be cored

- Site Access:

  - property ownership
  - terrain and vegetative cover
  - wet areas
  - size of working area
  - weather conditions
  - weight and size restrictions
  - need for barge equipment
  - location of drilling water source

- Seasonal Conditions Affecting Access:

- effect of freezing temperatures, mud, and snow on drilling progress
- use of water
- need to add antifreeze to pumps when not in use under freezing conditions
- antifreeze must be flushed out of hoses and pumps
- high water conditions

- Existence of Contamination:

- utilize decontamination protocols
- minimize disturbance and cross-contamination
- minimize impact on site chemistry
- control fluid drilling discharge
- reduce volume of contaminated spoils
- sampling requirements
- minimize crew's exposure to hazards

- Required Hole Size and Plumbness:

- single-level or muti-level well installations
- large-diameter wells
- installation of instruments and downhole equipment
- availability of drilling equipment
- adequate annular space for well installation
- use of packers

7.2 Pre-Drilling Activities

Prior to drilling the borehole, several pre-drilling activities should be performed. These activities, which include both pre-mobilization office tasks and pre-drilling field tasks, are discussed below. Once the pre-drilling activities are completed, drilling may commence.

7.2.1 Pre-Mobilization Tasks

1. Acquire as much geologic and hydrogeologic information about the site as possible. This information may include possible soil and groundwater contamination present, groundwater table depths and fluctuations, surficial and bedrock geology, approximate thickness of overburden, depth to top of weathered rock, depth to competent rock, and site access.

2. If possible, check and verify that the staked boring location corresponds to the location on the project plans.

    - Using field judgment, determine what type of drill rig (i.e., all terrain vehicle, track-mounted, truck mounted rig, skid rig) is required
    - Check to see if visible structures will prevent a hole to be drilled at the proposed boring location.

3. Using the known information about the site, review Section 7 and choose the proper type of drilling method for your site.

4. Once the drilling contractor and method is chosen, contact the drilling contractor. Prior to drilling activities, let the driller know what equipment is required to perform the job successfully. One should indicate the length of casing, type of casing shoes, length of augers, the number of auger cutting heads, and number and type of split spoon samplers required.

Note: The first communication with drilling subcontractor concerning scope of work for the drilling program shall always be performed prior to on-site activities.

5. Ensure that all utilities in the vicinity of the proposed boring(s) have been cleared by the appropriate authorized parties (i.e., Dig Safe, owner, etc.) or, if utilities exist, are visibly marked on the ground surface in the area of the proposed boring. In addition, keep a safe working distance from overhead utilities. **NOTE: The drilling specification should identify the party responsible for having utilities cleared. If the responsible party is not clearly identified then establish the responsible party. Ensure that utilities have been cleared prior to drilling.**

6. Potable water shall be used for drilling fluid unless an alternative source has been approved and identified in the project plans. Locate a nearby, convenient, clean water supply that can be utilized throughout the drilling program for decontamination and drilling purposes. If permits are required to connect up to nearby or on-site hydrants, they shall be acquired prior to the driller's mobilization on site. The water source should be tested if water quality samples are to be obtained later from the borehole or the monitoring well. Any testing shall be approved by the Project Manager prior to conducting the test.

7.2.2 Pre-Drilling Field Tasks

1. Construct a suitable decontamination pad for the steam cleaning of the drill rig, drilling equipment, and tools in accordance with **S&W SOP - Decontamination**. The drilling related equipment shall be decontaminated on site prior to drilling activities.

2. Communicate with the driller the requirements of the drilling program and what geologic and environmental information you require **(This information should be a review for the driller, but, in fact, he/she may not have knowledge of the drilling program's details).** Depending on the project drilling program, environmental samples may or may not be taken. If sampling will be conducted, inform the driller of the environmental sampling program that the project shall follow. This information includes sampling frequency, sampling depths, type of sample required (soil or groundwater), proposed depth to bottom of borehole, special sampling techniques, and amount, if any, of bedrock to be cored. Inform the driller if a monitoring well is to be installed and, if known, the depth of the screened interval. Ensure casing for holes in overburden have an inside diameter sufficient to accommodate the size of bit required for drilling in rock. Ensure that proper drilling fluids and proposed grout mixes to be used are in accordance with the project specifications.

7.3 General Overburden Drilling Method Procedures

The following sections outline general procedures used while drilling in overburden materials.

1. Assuming a vertical test boring, set the drill rig over the proposed boring location. Level the drill rig and ensure that the drill rods used to advance the hole are in a vertical drilling position directly above the hole

2. The inspecting geologist/engineer shall obtain and record measurements of tools to be used for drilling operations for depth and borehole diameter determination. Down-hole measurements taken by the drillers shall be to the nearest 0.1 foot.

3. Begin sampling or advancement of borehole to the desired depth utilizing one of the appropriate drilling methods described below. If conventional samples are to be taken, use sampling and logging procedures and sampling tools in accordance with the project sampling program, and **Stone & Webster SOP Soil Borings and Sampling** procedures.

4. Prior to obtaining a conventional soil sample, the bottom of the sampler should go to the correct sampling depth without resistance. If the sampler does not go to the correct sampling depth, cave-in material, wash material, or blow-in material may be resting at the bottom. If the amount of this "loose material" is more than a few inches in thickness, the hole should be flushed clean. If the loose material is sampled in addition to the representative native soil, it shall be removed and not used in the soil description. NOTE: When using augers for the purpose of using little or no water, do not flush the borehole with water.

5. When the borehole advancement tools are lowered into the borehole, the logger shall keep track of tool lengths to check driller's stated depth of borehole.

6. The logger shall make certain that the driller is performing depth measurements with a ruler and known tool lengths and not visually judging ("eyeballing") casing and tool projections above the ground. The logger shall maintain a mental note of depth to bottom of borehole by keeping track of the lineal feet of tools in and above the ground. By mentally subtracting the "stick-up" above the ground, the logger can maintain a constant approximate check on the hole depth and driller's indicated depths.

7. The breathing zone and return drilling fluids (water or compressed air) shall be screened for volatile organic compounds (VOCs) using an organic vapor analyzer designated by the project. A lower explosive limit meter (L.E.L.) shall be employed if required in SSHP. Record the measured readings at the depth and time of reading on the boring log.

8. During drilling activities, record drilling production, mechanical and/or drilling difficulties and sequences of drilling activities. Also record drill rig mobilization time, drill rig set-up time, and drilling commencement and completion times. This information should be recorded in a field log book. Pertinent details shall also be recorded on the borehole log (See **Stone & Webster SOP Soil Borings and Sampling**). Refer to Attachment A for blank boring log. Boring log details should include type of soil sample and all related information, type of drilling fluid, if used, various sizes of casings or advancement tools if borehole was telescopically advanced, approximate depth of strata change boundaries, borehole problems; i.e., hole squeezing, sudden tool drops, excessive grout takes, drilling fluid losses, etc. Note and record any changes in color of drilling fluids at their corresponding depths. Note and record readings on organic vapor meter during drilling operations.

9. For borings penetrating the water table, water level observations shall be measured and reported in accordance with **S&W SOP - Groundwater Level Measurement**. Observations should be made at the following times:

   - Following a period of suspended operations, even if the water level has not stabilized
   - Before casing or augers are pulled

   If the borehole remains open, immediately after the casing or augers are pulled

If no free standing water is observed in the bottom of the boring at the specified completion depth, state that: "No water encountered" on applicable boring log.

10. Refusal of drilling advancement tools (i.e., roller bit refusal, auger refusal, or casing refusal) is encountered when the borehole cannot be advanced using regular drilling advancement methods. Generally, refusal can be identified by the following characteristics:

    - Advancement of borehole is not noticeable or is very slow
    - A grinding noise is felt by the augers and sometimes the drill rig oscillates in a particular, repeatable fashion as the augers are rotating. If on a wood obstruction, a grinding noise won't be heard, but the rig may have a spongy feel
    - Cuttings returned to the surface may have, wood, concrete or rock chips, or fragments of steel.
    - If casing is driven, the number of casing blows increases significantly
    - The drilling downpressure may be significantly higher than under "normal" drilling conditions. The drill rig may be lifted off the ground surface.

If refusal is encountered in the boring, refer to the Soil Borings and Sampling for specific instructions. Determine if the borehole can be advanced with a core barrel. If the borehole cannot be cored, relocate the borehole in a direction approximately 5 feet distant from the original location. Measure the distance and direction and record this information on the boring log and in a field log book.

NOTE: The actual distance of movement necessary may be greater depending on the site conditions. If the required movement is excessive, contact the Project Manager.

11. When the final depth is encountered and if an observation well is not to be installed, the borehole shall be properly backfilled or grouted using suitable cement/bentonite/water mix ratios. Prior to grouting, ensure that the FSP is followed for specific instructions regarding backfilling and soil cuttings disposal. The following are general borehole grouting procedures.

    1. Calculate the theoretical volume of grout required to fill the annulus from the bottom of the hole to the ground surface.

    2. Prepare a suitable cement-based or bentonite-based grout mix based on the geologic formations encountered, hydrogeologic properties of the formations, and project requirements. Estimate at least 20 percent more than the theoretical volume of grout calculated in step 1 above.

       - For typical cement-based grouts, properly mix the grout as follows:

- Add one 94 lb bag of Type I or Type II Portland cement to every 6 to 7 gallons of water. Thoroughly mix the cement and water in a container until the slurry is free of lumps.

- Add 2 to 10 percent unaltered bentonite powder to retard shrinkage and provide plasticity. The bentonite powder is added dry to the cement-water slurry without first mixing it with water. Thoroughly mix the grout until free of lumps.

- For typical bentonite-based grouts, properly mix the grout as follows:

  - Bentonite powder must be the first additive placed in the water through a venturi device. Use approximately 1 to 1.25 lb of unaltered bentonite to each gallon of water.

  - After the bentonite-water mix is allowed to hydrate, add up to 2 lb of Type I Portland cement (per gallon of water) to stiffen the mix.

3. Repeat step 2 until the desired volume of grout has been obtained. It is recommended that extra grout be mixed to account for grout losses in the formation and at the ground surface.

4. With the casing or augers at the top of the divider seal, lower a tremie or grout pipe equipped with a side discharge to the required depth, slightly above the divider seal.

5. Inject grout through the tremie pipe to the top of the divider seal. The tremie pipe should be kept full of grout from start to finish with the discharge end of the grout pipe completely submerged as it is slowly and continuously lifted. Tremie the grout down the grout pipe in one continuous operation until grout of similar density discharges from the annular space at the ground surface. Approximately 5 to 10 feet of grout pipe should remain submerged in the grout until the grouting is complete. If casing or auger removal does not commence until grout injection is completed, then additional grout shall be tremied in the annular space, as needed during casing removal, to maintain a continuous column of grout up to the ground surface.

6. Once grouting is complete, pumps and hoses shall be flushed with clean water, after removing tremie pipe from borehole.

7. Record total grout volume used for annular seal and compare with calculated grout volume.

12. Soil cuttings and drilling fluids shall be sampled and disposed of in accordance with project specifications and **S&W SOP - Cuttings and Fluids Management**. When the borehole is completed and the area is cleaned up, all contaminated equipment, including down-hole tools, hand tools, and drill rig shall be decontaminated in accordance with **S&W SOP - Decontamination** at the designated project decontamination pad prior to further drilling activities.

13. Place a stake at the location of the boring or monitoring well and locate the as-built location on the project drawings. If the boring was relocated, note and record in which direction and the amount the boring was relocated.

8.0 METHOD-SPECIFIC OVERBURDEN DRILLING METHOD PROCEDURES

There are numerous overburden drilling methods available and research for new drilling techniques is continually developing. In this section, the procedures for six different overburden drilling methods have been outlined.

8.1 Hollow Stem Auger Drilling Methods

Drilling shallow borings (less than 30 feet in depth) are typically conducted, at least initially, using hollow stem auger (HSA) drilling techniques (HSA). Representative soil samples may be obtained with a sampler through the center of the lead auger. Commonly, the inside auger diameter is 4 to 6 inches, and the augers produce a borehole 8 to 12 inches in diameter. Auger rigs can be truck-, track-, or skid-mounted. The use of hollow stem augers as the method of overburden drilling are limited by groundwater conditions, soil characteristics, and the equipment used.

8.1.1 Hollow Stem Auger-Specific Equipment List

- Hollow stem auger flights with minimum inside diameter of 2.5 inches
- Hollow stem auger bolts to attach augers to one another
- Hollow stem auger plug
- Drill rods to attach to hollow stem auger plug
- Auger bit with extra teeth
- Water and mud tub (used if obstruction is encountered)
- Sampling tools

8.1.2 Procedures For Drilling With Hollow Stem Augers

1. Obtain soil sample at ground surface if applicable. Screw an auger plug onto a drill rod, lower it to the bottom of the hole and secure it to inside the auger cutting head if sampling is to be performed and/or if a groundwater monitoring well is to be constructed in the boring. The auger plug will remain in the cutting head as the augers are advanced. The plug follows the advancement of the augers. This plug will help keep unwanted soils from entering through the bottom of the augers.

2. With the first hollow stem auger flight and auger bit attached to the drill rig, rotate the auger into the ground surface to the desired penetration depth, to the limit of the auger flight, or to refusal. Augers are generally 5 feet in length (from top of joint to bottom of joint). Drill cuttings are compressed laterally and carried upwards on the auger flights. If conventional soil sampling methods are not to be used, gather cuttings from the soil pile and describe soil cuttings. **SAFETY NOTE: Sample auger cuttings only with the driller's permission and awareness. Do not remove cuttings from soil pile with augers rotating.**

3. Prior to sampling, the auger plug is slowly removed from the bottom of the borehole by decoupling the plug from the cutting head (by counter rotation) and raising the drilling rods.

After sampling, the drilling roc and drilling plug are replaced, another hollow stem auger flight and drilling rod section are added and this process is continued until the desired depth is reached. If an obstruction is encountered, and depending on the requirements of the project's drilling program, the driller may attempt to employ one of the following (with the geologist's/engineer's approval):

- Switch to drive and wash methods, or
- Grout and abandon the hole

4. If the desired depth has been reached and an observation well will not be installed, tremie grout the borehole following the procedures in Section 7.3 Item 11.

   NOTE: Hollow stem augers should not be filled with drilling water on hazardous waste sites. Drilling muds should be avoided.

8.1.3 Advantages/Disadvantages of Drilling With Hollow Stem Augers

The advantages of drilling with hollow stem augers are:

- Simplicity of procedure
- Relatively inexpensive
- Can be used to obtain soil samples from a wide range of conditions
- Drilling fluids are generally not required
- Equipment is readily available
- The center auger plug can be removed an observation well installed
- Split-spoon samplers can be used readily

The disadvantages of drilling with hollow stem augers are:

- Good seals around the top of filter sand packs may be difficult to achieve due to the large annular space when augers are removed
- Difficulty in penetrating soils with large percentage of cobbles or boulders
- Difficult to sample unconsolidated granular soils below the water table
- Cannot be used to drill hard rock formations
- Generally incapable of drilling much deeper than 100 feet
- Potential for blow-ins are possible if the material at the bottom of the augers is loose sand or silt and when the head differential between the outside and inside of the casing is large
- The augers tend to smear the sides of the borehole walls in fine-grained materials which may reduce or modify the permeability of a proposed monitoring well installation and provide well development difficulties
- As the cuttings are brought upwards, there is potential for cross contamination

8.2 Drive and Wash Drilling Method Procedures

Drive and wash drilling is begun by driving a hollow casing equipped with a hardened steel casing shoe at the bottom. The casing is driven using repeated blows of a 300 lb. weight repeatedly dropped from at fixed height onto the casing assembly. Casing is normally driven in five foot depth intervals. The casing is then washed out with the advancement of a roller bit. The washing is accomplished by attaching the roller bit to the bottom of the drill rods and rotating the drill rods. The unconsolidated material loosened by the roller bit rises to the ground surface in the space between the roller bit and the casing by means of liquid drilling fluid. This process is repeated until the depth in interest is achieved.

A soil sample is collected by lowering a sampling device (usually a split spoon sampler), attached to drilling rods, to the bottom of the cleaned out casing. The sampler is in turn driven into the subsurface below the bottom of the casing by using a weight drop method. The casing is then driven to the next sampling point and the sequence is repeated. When the unconsolidated materials consist of very dense material, the roller bit may be advanced ahead of the casing to loosen the material prior to driving casing. A monitoring well can be constructed and installed inside the temporary steel casing. The steel casing is removed during well construction. A large quantity of drilling fluid may require collection and disposal.

Drive and wash drilling techniques can help prevent borehole wall collapse and lost circulation. However, lost circulation will probably occur when the materials consist of fractured bedrock or cobbles and boulders.

8.2.1 Drive and Wash-Specific Equipment List

- Steel drill casings
- Tricone roller bits
- Hardened steel casing drive shoes
- Hollow drill rods
- Sampling tools
- Clean water supply, water tank and pump

8.2.2 Procedures For Drilling With Drive and Wash Methods

1. Obtain a soil sample at the ground surface with an appropriate sampler if applicable. Drive a five-foot length of casing to the next sampling point or to the bottom of the casing. The casing shall be driven with a 300 lb. hammer using a hammer drop of 24 inches. The casing blows may be recorded for discrete intervals of casing penetration; changes in strata may be detected by changes in casing blows per foot, especially in shallow borings.

2. After the casing is driven to the desired depth, the casing is removed from the drill rig's drive head and is replaced with hollow drill rods and a tricone roller bit. Water is forced down through the rotating hollow drill rods and exits the side-discharge tricone roller bit at the bottom of the casing. The soil cuttings are dislodged and are carried to the surface for temporary collection into a mud tub. In loose silts and sands, it is suggested that the casing be filled with water to the top of the casing during drilling operations to obtain representative soil samples. The drill rods and sampler should be lifted off the bottom slowly, while maintaining a head of water to the top of casing if conditions dictate. Recirculation of drilling fluid is unacceptable if the boring is contaminated.

3. After a soil sample is obtained, steps 1 and 2 are repeated until the desired depth is obtained.

4. If the desired depth has been reached and an observation well will not be installed, tremie grout the borehole following the procedures in Section 7.3 Item 11.

8.2.3 Advantages/Disadvantages of Drilling With Drive and Wash Methods

The advantages of drilling with drive and wash methods are:

- An open borehole during drilling is assured because of the presence of the casing
- Clean, relatively undisturbed borehole walls are produced
- Method allows for inspection of the cuttings throughout the washing process enabling strata changes
- Method allows for installation of monitoring wells inside the casing
- In-situ horizontal and vertical hydraulic conductivity measurements can be made
- Method allows for collection of split-spoon or similar representative samples
- It is a superior method for monitoring well installation

The disadvantages of drilling with drive and wash methods are:

- A substantial source of water is required and a drilling water discharge is produced if drilling fluids cannot be recirculated
- The method is relatively slow; footage rates of 30 to 60 feet per day are common in New England soils
- The water table and water-bearing zones may be difficult to recognize due to the addition of water into the system during drilling
- Water circulation may be difficult to maintain in highly permeable, unsaturated soils
- This method is difficult for very coarse sands and gravels and cobbles and boulders
- There is a very slight chance for potential for cross-contamination due to flow along the outside of the casing

8.3 Sonic (Rotary-Vibratory) Drilling Methods

The sonic drilling method is one of the most recent development in drilling technology. It is a drilling system that employs the use of high frequency mechanical vibration and rotation to obtain continuous core samples of overburden and most bedrock formations.

NOTE: Most of the information contained in this procedure was taken directly from a Boart Longyear catalogue on Sonic Drilling.

- **Principle of Sonic Drilling**

This drilling technique vibrates the entire drill string at a frequency rate between 50 and 150 cycles per second. The word "sonic" describes the drilling method because this frequency falls within the lower range of sound vibration that can be detected by the human ear.

The sonic drill rig looks and operates much like any conventional top-drive rotary or auger drill rig. The significant difference is that a sonic drill rig has a specially designed hydraulically powered drill head or oscillator which generates adjustable high frequency vibrational forces. The sonic head is attached directly to the core barrel, drill pipe or outer casing, sending the high frequency vibrations down through the drill steel to the face of the drill bit.

The oscillator uses two eccentric, counter rotating balance weights or rollers that are timed to direct 100 percent of the vibration at 0 degrees and 180 degrees. There is an air spring system in the drill head that insulates or separates the vibration from the drill rig itself.

The vibrational frequency is controlled to suit operating conditions and to achieve optimum drilling rates. When the vibrations coincide with the natural resonant frequency of the steel drill rod or casing a natural phenomenon called resonance occurs. Resonance allows the rig to transfer the vibrational energy into the top of the drill string, and as the drill string starts to resonate it acts like a flywheel or a spring delivering tremendous amounts of energy directly to the bit face. In addition, the fact that soil particles along the side of the drill string tend to move away from the drill string allows for very fast penetration rates.

- **Sonic Borehole Advancement**

  - **Process**

    The processes which result in borehole advancement are fracturing, shearing and displacement. Drilling through cobbles, boulders and rock is caused by fracturing of the material by the inertial moment of the drill bit. Shearing takes place in dense silts, clay and shales, provided the amplitude of the drill bit is high enough to overcome the elasticity of the formation material. Displacement occurs when unconsolidated formation material is moved away by the vibrating drill bit. The drill bit face is designed for three cases which are as follows:

    - "Crowd in" - moves all the bit face material into the core barrel
    - "Crowd out" - moves all the bit face material into the borehole wall
    - "Neutral" - lets the bit face material seek the
    - path of least resistance

    NOTE: This method typically generates approximately 10 to 20% of the volume created by hollow stem auger, rotary or cable tool methods. small percentage of soil cuttings; and it may not need a drilling fluid medium to carry cuttings to the surface unless it is for a well installation. Depending on the stability of the materials to be drilled, the inner core barrel can be advanced ahead of the casing. Both the inner core barrel and the outer casing penetrate the subsurface using vibratory methods, they may or may not be rotating.

  - **Operation**

    Optimum penetration rates are obtained when the vibration frequency and down-pressure work in harmony. Experienced drillers have a "feel" when this occurs, and it is monitored by observing the oil pressure gauges in the system. The driller watches the pressure gauges and modifies the frequency of the vibration being generated, the rotation, or the down pressure for conditions encountered. Adjustments to the frequency are accomplished with a lever which controls two hydraulic motors that drive the counter- rotating rollers.

8.3.1 Sonic-Specific Equipment List

- Sonic vibratory head mounted on sonic drill rig
- Clean water supply
- Air compressor
- Water pump
- Steel outer casing
- Core barrel and inner casing
- Drill pipe rack
- Drilling platform
- Rotating and vibrating drill bit (three different types)

8.3.2 Procedures For Drilling With Sonic Methods

1. Choose the type of sleeve used for sample collection if samples are to be collected. A sleeve used for the inner core barrel is selected depending on the quality of soil sample to be recovered. The sample can be extruded into a clear plastic sleeve or into a stainless steel tray. If less sample disturbance is required, a clear plastic liner or stainless steel split liner can be placed inside the inner core barrel.

2. Water, air, drilling mud, or lack of drilling fluid medium are various choices available to drill the borehole. Determine the most suitable drilling fluid based on the expected conditions and advantages/disadvantages of the available drilling fluid(s).

3. Drill the inner core barrel into overburden to the desired depth. The driller shall watch his pressure gauges and make the necessary adjustments. Remove the core barrel at the desired core length and extract core sample. If the hole collapsed prior to core barrel's replacement into the hole, spin the outer casing to the bottom of the cored hole. Immediately follow coring operations with the outer casing if the overburden materials collapse around the cored interval. If a monitoring well is to be installed, the outer casing shall be drilled to the bottom of the borehole or to the bottom of the well screen.

4. Repeat steps 1 through 3 until the desired depth is reached. Install a monitoring well if required.

5. Tremie grout the borehole in accordance with Section 7.3, Item no. 11.

8.3.3 Advantages/Disadvantages of Drilling With Sonic Methods

The advantages of drilling with sonic drilling methods are:

- Ability to obtain large diameter (3- to 10-inch) continuous core samples of almost any type overburden without the use of air, fluid, additives, and with or without rotation.
- It can drill through various types of construction debris (i.e., wood, concrete, boulders)
- Wireline or hammer system available for bedrock coring
- Capable of drilling with 3- to 10-inch-diameter core barrel and can advance up to 12-inch diameter well casing
- Flexible drilling (air or water is available

- The outer casing prevents cross contamination and formation mixing and allows for controlled placement of wells
- Core samples can be taken directly from the core barrel by extruding it into a plastic sleeve, stainless steel tray or other suitable receptor. For less sample disturbance, samples can be collected with clear plastic or stainless steel split liners which are placed in the core barrel
- It can drill faster than conventional drilling methods
- Appears to be cost effective on larger projects where the boreholes are greater than 500 feet in depth or where scores of shallow boreholes are drilled
- When compared to other drilling methods, sonic drilling methods substantially reduce investigation derived waste and produces uniform boreholes with minimum drift

The disadvantages of drilling with sonic drilling methods are:

- Expensive. Requires at least one 500 foot deep hole or approximately thirty 10-foot deep holes to make it cost effective
- Bedrock consisting of sandstone is difficult to core
- Sonic drilling experience is crucial for proper operations
- If major mechanical failures occur, replacement parts may not be readily available
- Drill rigs are larger and use a flat bed truck for a drill pipe platform

8.4 Procedures for Drilling with ODEX System

The ODEX drilling method has been adapted from an air percussion drilling method used in the construction industry to install earth anchors and tie-backs. The standard percussion drilling equipment has been modified to allow for the installation of a heavy-duty temporary casing. The ODEX method is capable of drilling 3- to 6-inch diameter holes in unconsolidated materials and bedrock. Conventional sampling is possible with a slight modification of the drilling equipment. The ODEX drilling system is suitable for most soil conditions, although the bit has a tendency to plug in cohesive and granular soils with fines.

The borehole is advanced to a required depth using compressed by a combination of pilot and reamer bits. The pilot bit advances the borehole and then it is enlarged with an eccentric reamer bit to the desired depth. Temporary steel casing is installed directly behind the advancement of the eccentric reamer bit. The compressed air is sent down into the borehole from the surface through a hollow center rod. The cuttings are forced upward between the outside diameter of the hollow rod and the inner wall of the outer casing

8.4.1 ODEX System-Specific Equipment List

- Pilot bit
- Eccentric reamer bit
- Sampling tools
- Steel drill casings with hardened steel drive shoe welded to leading edge the drive casing
- Compressed air supply with hoses
- Down-hole hammers
- Hardened steel drive shoes

8.4.2 Procedures For Drilling With ODEX System Drilling Method

1. Advance the boring to the required depth by a combination of pilot and reamer bits. This method incorporates simultaneous advancement of the boring with the pilot bit and enlargement with an eccentric reamer bit immediately followed by a driven temporary steel casing. The casing is driven into place by a percussive motion without rotation.

2. When the sampling depth or desired depth is reached, rotate the pilot bit in the opposite direction and align the pilot bit with the eccentric reamer.

3. Withdraw the drill tools from the hole after the bit and reamer are aligned; and finish driving the steel casing to the bottom of the borehole.

4. Proceed to take a representative soil sample inside the casing.

5. Remove sampler (if samples are taken) and repeat steps 1 through 4.

6. At the completion of the hole the steel casing can be removed. If a monitoring well is desired and the temporary steel casing is at least approximately 4 inches in diameter, a smaller diameter monitoring well casing can be installed inside the steel casing. The steel casing is removed upon well installation. Refer to **S&W SOP - Monitoring Well Installation & Development** for monitoring well installation procedures.

7. Grout the hole in accordance with Section 7.3, Item 11

8.4.3 Advantages/Disadvantages of Drilling With ODEX System Drilling Methods

The <u>advantages</u> of drilling with the ODEX system drilling methods are:

- Drilling method is fast and extremely cost effective.
- Provides for the installation of temporary and/or permanent casing
- Small rigs can be used on most terrains and under most weather conditions
- Borings can be used to install monitoring wells or instrumentation
- Standard soil samples can be taken

The <u>disadvantages</u> of drilling with the ODEX system drilling method are:

- Soil sampling may result in a significant reduction in drilling rate
- Requires an air compressor; air must be filtered to minimize volatile contamination
- Specialized equipment may not be readily available; requires experienced operator
- Not suitable for fine-grained soils due to problems with the bit plugging
- Air emissions may be a problem at contaminated sites due to volatile and aerosol material discharged to the work environment

8.5 Dual Rotary Advancement Drilling Method Procedures

The dual rotary advancement drilling method is a unique method of rotating and advancing casing while simultaneously drilling. The DR machine rotates standard mild steel casing ranging from 6 to 24 inches in diameter while simultaneously drilling out the inside material with either a down hole hammer or a tricone roller bit. Compressed air is generally used for borehole bailing; however, mud rotary drilling can also be performed.

A carbide studded steel drive is welded to the bottom of the first joint of the steel casing. This carbide ring cuts through boulders and overburden material while being rotated either to the left or right. A lower drive assembly chucks hydraulic jaws around the casing to provide the rotating torque. A similar, but smaller top drive assembly rotates 4- through 12-inch-diameter drill rods inside the outer casing. Each drive unit acts independently and allows drilling inside and ahead of the casing. Drill cuttings are returned in the annular space between the drill rods and the outer casing. However, DR rigs must have a rotating discharge swivel that allows the cuttings to go to a cyclone that separates the compressed air from the drill cuttings. Split spoon samples are an optional sampling tool.

8.5.1 Dual Rotary Advancement-Specific Equipment List

- Dual rotary drill rig
- Air compressor
- Carbide studded drive shoe
- Steel casings
- Drill rods
- Separation cyclone
- Cuttings containment unit
- Down hole air hammer or tricone bit
- Discharge swivel

8.5.2 Procedures For Drilling With Dual Rotary Advancement Drilling Method

1. Obtain split spoon surface at ground surface if samples are required.

2. Advance casing and drill bit (tricone roller bit or down hole hammer) simultaneously or independently of one another to the desired depth. Compressed air can be used above and below the water table. The down hole hammer and the roller bit are used with compressed air, and air or water as drilling fluids, respectively. NOTE: If split-spoon or other sampling method is to be employed, the hole should be free of undisturbed material below the bottom of the casing (i.e., the drill bit should penetrate to the bottom of the casing, but not below the bottom of the casing).

3. Check the cuttings in the cuttings containment unit once through the cyclone separator to determine soil characteristics as drilling proceeds.

4. Repeat step nos. 2 and 3 until the desired depth is encountered

5. If a monitoring well is not to be installed, grout the hole in accordance with Section 7, Item 17

8.5.3 Advantages/Disadvantages of Dual Rotary Advancement Drilling Methods

The advantages of drilling with dual rotary advancement drilling methods are:

- Capable of drilling and advancing casing simultaneously
- Drills faster and more reliably than most other drilling methods
- Cased holes in unconsolidated materials in excess of 500 feet
- Monitoring wells from 2- to 16-inch-diameter well casings can be constructed with up to 24-inch filter pack
- Air or water can be used as a drilling fluid
- Instant return of cuttings for soil description
- Conventional split-spoon samples or cyclone samples can be obtained
- Method suitable for gravels, cobbles, boulders and weathered bedrock

The disadvantage of drilling with dual rotary advancement drilling methods is that welding and cutting of the casings is time consuming.

8.6 Geoprobe-Type Drilling Services (Needs additional info

The GEOPROBE is a hydraulically powered percussion drilling machine used for small diameter subsurface investigations. It can obtain continuous soil cores, discreet soil samples, groundwater samples and vapor samples along with installation of permanent sparge points. It is ideally suited for initial subsurface screening purposes.

8.6.1 Geoprobe Drilling Services-Specific Equipment List

- Geoprobe drill apparatus mounted on four wheel drive vehicle (vehicle could be a Bobcat Loader)
- Decontamination equipment
- Small diameter drill rods
- Sampling tools designed for geoprobe

8.6.2 Procedures For Drilling With Geoprobe Drilling Equipment

The following presents a procedure for collecting soil samples using Geoprobe (direct push) technology.

- Determine that there are no utilities above or below the sampling location.
- Set up a staging area near the sampling location with plastic sheeting for sample collection.
- Decontaminate the soil sampling device.
- Push the sampling device to the desired depth. Retrieve the sample, remove the acetate sleeve from the sampling device, and cut open the acetate sleeve to expose the soil sample.

- Screen the soil sample with the photo ionization detector (PID) to detect organic vapors.
- Describe the soil sample on a geologic log according to the Burmister Soil Classification system.
- Collect the soil sample in labeled containers provided by the laboratory.
- Place the soil samples in a cooler maintained at 4 degrees centigrade.
- When the sampling device has reached the final depth, remove the soil sampling device and fill the borehole with neat cement grout.
- Restore the surface as necessary (i.e.; cold patch blacktop surfaces)
- Decontaminate sampling tools before each boring, after collecting each soil sample, and after each boring.

8.6.3 Advantages/Disadvantages of Geoprobe-Type Drill Rig

The advantages of drilling with Geoprobe-type equipment are:

- **General Advantages**
  - Low overall costs
  - Accessible to limited areas, low profile
- **For soil sampling**
  - No cuttings generated
  - Continuous coring
  - Discrete interval sampling
  - Split barrel sampler
  - Brass, stainless steel, or acetate liners available on some rigs
- **Soil Vapor Sampling**
  - Some rigs are EPA and RWQCB accepted
  - Depths to 50 feet
  - Inert 1/8-inch sampling tubing
  - Easy to decontaminate
- **Groundwater Sampling**
  - Stainless steel screen

- Installation of temporary "Mini-wells"
- Vertical water gradients

The disadvantages of drilling with Geoprobe-type equipment are:

- Capable depth of only approximately 50 feet
- Experienced drillers are necessary
- Not appropriate for formations with cobbles or boulders
- Cannot core rock
- Only small diameter wells can be installed

9.0 GLOSSARY OF TERMS

Anchor - a device which adheres to soil-like material and acts as a anchor for transference of loads to a tie-back

Borehole - a circular open or uncased subsurface hole created by drilling

Casing - pipe, finished in sections with either threaded connections or beveled edges to be field welded, which is installed temporarily or permanently to counteract caving, to advance the borehole, or to isolate the zone being monitored, or combination thereof

FSP - Field Sampling Plan

Groundwater - the water contained in interconnected pores located below the water table in an unconfined aquifer or located in a confined aquifer

SSHP - Health and Safety Plan

Hollow Stem Auger - a steel, hollow, spiral-shaped driller's tool used to advance a borehole in unconsolidated materials

Interface Probe - a hand-held, battery operated instrument used for measuring the thickness of separate phase non-aqueous phase liquids in a well

Permeability - the capacity of a porous rock, sediment, or soil for transmitting a fluid

Slurry - a highly fluid mixture of water and finely divided material

Split-Spoon Sampler - a 2-inch (OD) steel tube, split in half lengthwise, with the halves held together by threaded collars at either end of the tube. This device is driven into resistant materials for collection of a soil sample using a 140 lb. drive weight mounted in the drilling string.

Tieback - a device that is used to support a structure through strands of wires or rod which are connected to an anchoring system inside soil-like material

Tremie Pipe - a pipe or tube that is used to transport filter pack materials and annular sealant materials from the ground surface into the borehole annulus or between casings and casings or riser pipe of a monitoring well

Water table - the surface in an unconfined aquifer or confining bed at which the pore water pressure is atmospheric.

10.0 ATTACHMENTS

Attachment A - Blank Boring Logs

Attach 4 13.1

Stone & Webster Engineering Corporation	BORING LOG	Boring J.O. Sheet 1 of

Site:
Client:
Coordinates:
Groundwater Depth/Date:
Contractor:

Depth to Bedrock:
Driller:

Logged by:
Date Start - Finish: / / - / /
Ground Elevation: ft
Total Depth Drilled: ft
Rig Type:

Methods:
Drilling Soil:
Sampling Soil:
Drilling Rock:

Casing Used:

Comments:

Elev (ft)	Depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N Value	USC Symbol / Drill Rate (min/ft)	Sample Description

Legend/Notes
- Datum is
- ∇ indicates groundwater level.
- ▌ indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- * indicates use of 300 pound hammer.

- Sample Type:

Approved	Date

FTTECCI 6 18.2

Stone & Webster Engineering Corporation	BORING LOG	Boring J.O. Sheet of

Site: Logged by:

Elev (ft)	depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N Value	USC Symbol / Drill Rate (min/ft)	Sample Description

Note: See Sheet 1 for Boring Summary and Legend Information

Approved Date

Labeling, Packaging, and Shipping Environmental Samples

SW-MWD-504-0

STANDARD OPERATING PROCEDURE **FUSRAP MAYWOOD SUPERFUND SITE** **STONE & WEBSTER ENGINEERING CORPORATION**		
TITLE: **Labeling, Packaging, and Shipping Environmental Samples**	**NO.:**	SW-MWD-504-0
	PAGE	1 of 10 plus two attachment pages
	DATE:	May 1999
APPROVED: Project Manager Project Engineer		

1.0 PURPOSE

This Standard Operating Procedure (SOP) - **Labeling, Packaging, and Shipping Environmental Samples** is to be employed at the FUSRAP Maywood Superfund site when samples are to be collected for laboratory analysis.

The purpose of this SOP is to provide detailed guidance on how to label, package and ship samples of various matrices for analysis by a fixed-based laboratory. It also provides guidance on how the samples should be labeled and how the Chain-Of-Custody (COC) form that accompanies the samples should be filled out.

2.0 SCOPE

This SOP details the materials, equipment, and methods common to all sample labeling, chain-of-custody, packaging, and shipping activities for groundwater, surface water, soil, and sediment samples. Actual sample collection or addition of chemical preservatives to samples are not addressed in this SOP. See the Maywood task-specific Sampling and Analysis Plan (SAP) for this information. For guidance on shipment of radioactive samples, see Maywood SOP 508, Procedure for Shipping Radiologically Contaminated Environmental Samples. Always consult program-specific requirements for labeling, packaging, and shipping (see Section 3.1.6 of the Maywood Field Sampling Plan (part of the Chemical Data Quality Management Plan) to ensure compatibility of this SOP with project requirements. **Field changes to this SOP shall be discussed with the Project Manager or Project Chemist prior to implementation and shall be documented in project field logbooks.**

Samples classified as Poison A, Poison B, radioactive, corrosive, or oxidizer, or remediation wastes are not covered in this SOP.

3.0 REFERENCES

FUSRAP Maywood Superfund Site Chemical Data Quality Management Plan, Stone & Webster, May, 1999.

4.0 DEFINITIONS

None.

5.0 RESPONSIBILITIES

5.1 PROJECT MANAGER

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified for the needed work.

5.2 PROJECT ENVIRONMENTAL ENGINEER

Translates the USACE's requirements into technical direction of project. Reviews and approves technical progress, ensures that the CQCSM has been properly briefed and is prepared for packaging and shipping task.

5.3 CONTRACTOR QUALITY CONTROL SYSTEM MANAGER (CQCSM)

The CQCSM, or his designee ensures that field personnel have been briefed in chain-of-custody, sample packaging and shipping in accordance with the project requirements, this SOP and related SOPs. Assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin. Assures that all necessary personnel are mobilized on time. Maintains daily log of activities during each day of fieldwork.

The CQCSM, Project Chemist, or their designee is also responsible for determining that samples are properly packaged and shipped, and for determining that chain-of-custody procedures are implemented from the time the samples are collected to their release to the shippers.

Should field conditions necessitate changes in the number and/or type of samples collected, or changes in sample shipment dates, the CQCSM must notify the Project Manager and the Project Chemist of the changes prior to completion of field activities.

The CQCSM coordinates and consults with the Task Manager or Project Superintendent on decisions relative to unexpected occurrences or deviations from this SOP during the packaging and shipping phase.

The CQCSM shall notify the Project Chemist of the number and type of samples and approximate collection, shipment, and delivery dates for all samples prior to leaving for the field.

5.4 SITE SAFETY & HEALTH OFFICER

All field activities must be carried out in accordance with the Maywood General Site Safety and Health Plan (SSHP). Ensuring the fulfillment of the requirements of the SSHP is the responsibility of the Site Safety and Health Officer (who may also serve as a sample packer and shipper).

5.5 PROJECT CHEMIST

The Project Chemist is responsible for coordinating sample shipment with the laboratories to minimize holding times and assure proper handling of all samples.

The Project Chemist shares responsibility with the CQCSM for determining that samples are properly packaged and shipped, and that chain-of-custody procedures are implemented from the time the samples are collected to their release to the shippers.

5.6 SITE PERSONNEL

All employees who are engaging in sample packaging and shipping activities are required to read and sign the task-specific Site Safety and Health Plan (SSHP) and to follow the procedures in this SOP, unless superseded by project-specific requirements. All sample packaging and shipping activities, including deviations to this SOP, will be recorded in field logbooks during on-site activities.

Field sampling personnel are expected to carry out the sample packaging and shipping activities. They are responsible for the care and custody of the samples collected until they are properly disposed or dispatched. The CQCSM or Project Chemist should be contacted if any problems arise during this phase of the sample collection process.

Personnel assigned to a project team with the task of collecting and shipping samples will be trained in specific techniques of sample collection and shipment.

6.0 PROCEDURE

6.1 EQUIPMENT

The following is a list of equipment & material commonly used for labeling, packaging and shipping samples.

- Nylon filament tape
- COC forms
- COC seals
- Vermiculite, Styrofoam, and/or bubble wrap
- Resealable plastic bags
- Permanent felt tip marker
- Pen (black permanent ink)
- Ice
- Shipping coolers
- Labels
- Metal cans (if high hazard samples are anticipated)
- Absorbent pads
- Transparent shipping tape
- Trash bags
- Duct tape (seals off openings in coolers)
- Knife or scissors to cut tape

6.2 SAMPLE LABELING

Prior to sample removal from the sampling location and packaging and shipment to an offsite laboratory, all sample containers will be assigned a permanent sample label. All notations on the label will be marked using indelible ink. Use prepared sample labels (whenever possible) to document all information necessary for effective sample tracking. In the case of soil samples, the boring number and the depth at which the sample was taken should also be included on the label. The information on the label will include the following:

- ♦ Date and time of sample collection (use military 24-hour format for the time)
- ♦ Sample ID number
- ♦ Project identification
- ♦ Type(s) of analysis to be performed
- ♦ Preservation method used for sample

The sample label can be modified to satisfy USACE/project specific requirements. For example, all sample labels and COCs associated with samples shipped to the USACE QA laboratory shall have a Chemical Quality Assurance Branch (CQAB) assigned number. corresponding to the numbering sequence in the CQAB laboratory's Laboratory Information Management System (LIMS).

A set of labels will be prepared and numbered to correspond with unique samples to be collected. **For certain projects requiring strict quality control, blank, duplicate, or field spikes, the QC sample type shall not be identified as such on the label as this may compromise the quality control function. In those instances, assign a unique sample number to each QC sample and record the type of QC sample collected in the field logbook. In all other instances, assign a sample number using the Sample ID System for all Maywood Sites (from Table 3-1 of the Maywood FSP) as follows:**

XXXX-AAAmmNNNNn-##### - to be used for data base reporting

XXXX##### - to be used for sample collection and delivery to lab

<u>XXXX = Site Designator</u>
Maywood Interim Storage Site = MISS
Stepan Property = STEP
Sears Property = SEAR
New Jersey Vehicle Inspection Station = NJVS
etc. (others as needed)

<u>AAA = Area/Activity Designator</u>
Pilot Test = PT1
Burial Pit 1 = BP1
Background = BKG
etc. (others as needed)

<u>mm = Media</u>
Surface Soil = SS
Subsurface Soil Boring = SB
Sediment = SD
Ground Water = GW
Surface Water = SW
Storm Water = ST
Aquatic Biota = AB
Terrestrial Biota = TB
Air Filter = AF
Radon Detector = RD
TLDs = TD
Quality Control = QC
etc. (as new media types are identified)

<u>NNNN = Station Number</u>
Unique station identifier

<u>n = Sample Type</u>

Regular = 0, Trip Blank = 3, Duplicate = 1,
Equipment Rinsate = 4, Split = 2, Site Source Water Blank = 5

<u>##### = Sequential Sample Number</u>
Unique to each site

6.3 CHAIN-OF-CUSTODY

Stone & Webster has established a program of sample custody that shall be followed during sample handling activities from the particular Maywood property to the laboratory. This program is designed to ensure that each sample is accounted for at all times.

The objective of the sample custody identification and control system is to ensure, to the extent practicable, that the following conditions are met:

- Samples scheduled for collection are uniquely identified
- The correct samples are analyzed and are traceable to their records
- Important sample characteristics are preserved
- Samples are protected from loss or damage
- Any alteration of samples (e.g., filtration, preservation) is documented
- USACE confidentiality is maintained
- Sample COC shall be maintained through sample collection, shipment, storage, and analysis as a legal record and auditable trail of sample possession.
- Possession will be traceable by means of a COC record. The COC bears the signatures of the persons in possession of the samples. **The COC shall remain with the samples at all times until receipt by the laboratory.**

The appropriate sampling and laboratory personnel shall complete COC records for each sample. The following COC protocol shall be employed by sampling crews and recorded on the COC for each sample:

- Maywood Sample ID number (as described in the Labeling Section of this SOP). Use a separate column (or line depending on the configuration of the particular COC being used) for each parameter to be tested for a given sample number.
- Bottle types and sizes

- Analytical test parameters or test parameter method (in Analysis/Remarks Section); e.g., EPA Method 8270. Also indicate lab QC sample, if applicable; e.g., MS/MSD
- Specific instructions to the lab; e.g., unique turnaround times, specific analytes or other special instructions for analysis
- Number of containers corresponding to each sample ID number and parameter,
- Preservatives used (if any),
- Specific sample collection method (grab or composite)
- Type of matrix
- Date and time of each sample collection
- Name(s) of the sampler(s) and signature of the person shipping the samples
- Date and time that the samples were sealed for delivery
- Names of those responsible for receiving the samples at the laboratory (to be filled out at the laboratory)

The COC record shall be completed in triplicate using black waterproof ink. If any changes or corrections are made, they should be made by drawing a single line through the entry, initialing and dating the change, and entering the correct information. One copy shall accompany the samples to the laboratory, another is kept by the sample crew chief and transferred to the Project Chemist, and the last copy shall be maintained in the project file. A copy of the chain-of-custody form will also be forwarded via facsimile to the USACE Contracting Officer (CO) whenever samples are shipped from the field site. Additional copies shall be provided as needed for the project. Whenever collocated or split samples are collected for comparison analysis by the USACE QA Laboratory or a government agency, a separate chain-of-custody is prepared for those samples and marked to indicate with whom the samples are being split.

After shipment, the laboratory sample receiver signs and records the date and time of receipt on the COC, completing the sample transfer process.

6.4 SAMPLE PACKAGING

Sample containers are generally packed in insulated coolers for shipment. Appropriate packing materials are bubble wrap and vermiculite. Bottles are packed tight so that they cannot move during shipment. The following steps shall be followed:

- To eliminate the chance of breakage during shipment, approximately one inch of inert cushioning material shall be placed in the bottom of the cooler.

- Place each sample container tightly inside its own plastic bag and seal, as a precaution against cross-contamination due to leakage or breakage.

- Place containers upright in the cooler in such a way that they will not touch during transport.
- After samples have been packed, ice shall be placed in double Ziplock bags and added to the cooler. Use enough ice to ensure that the temperature of the cooler contents are $\leq 4^{\circ}C$. Also make sure the entire cooler is packed tightly so no containers shift during shipping, thus avoiding breakage.
- Include all paperwork in a separate Ziplock bag taped to the inside lid of the cooler.

Chain-of-Custody documents will accompany all shipped samples

For courier pickup - COC forms will be completed by the sampler and courier and placed in the cooler (see Sections 6.3 and 6.5).

For sample shipment - COC forms will be completed by the sampler and placed in the cooler (see Section 6.3).

1. Duct-tape cooler lid seal and drains. Tape the cooler shut with strapping tape.
2. Affix numbered, signed, and dated custody seals to ensure that samples have not been disturbed during transport. Cover custody seals with clear tape.
3. If not already there, the lab address will be written on the top of the cooler with indelible ink.

6.5 SAMPLE SHIPPING

After collection, all samples shall be transported to the contract laboratory in such a manner as to preserve their integrity. To maintain the required level of sample custody, overnight carrier shipping manifests are normally employed. Field samples that require shipment shall be sent to the laboratory by an overnight courier service within 24 hours of their collection. No sample shall remain on site for more than 24 hours after collection unless previous arrangements have been made with the laboratory, i.e., weekend sampling.

Courier Pickup of Environmental Samples

If the laboratory is located within a reasonable distance from the site, arrangements may be made to have the laboratory pick up the samples. Most laboratories have their own courier service and will pick up samples if the site is within 200 miles of their facility. **Coordinate with the receiving laboratory**

<u>prior</u> to sample collection events to ensure that the desired pick-up will occur on time.

When the samples are transferred to a laboratory courier, the sampler shall:

- Sign, date, and enter the time in the "Relinquished by" entry location of the COC form.
- Make sure that the courier receiving the sample signs the "Received by" entry of the COC form.

Shipping Environmental Samples

Environmental samples requiring shipment to a laboratory shall be sent next-day delivery by Federal Express or an equivalent overnight carrier. **The receiving laboratory shall be given advance notice by the Stone & Webster CQCSM no later than 48 hours before sample shipment.**

If Friday sampling is unavoidable and Saturday delivery is not possible, samples shall be properly stored (custody and sample preservation must be maintained) over the weekend. If prompt shipping and laboratory receipt of samples cannot be guaranteed, the samplers will be responsible for proper storage of samples until adequate transportation arrangements can be made or sample collection schedules will be modified by the CQCSM. If holding times would be exceeded by storing samples over the weekend (e.g., if there are 24 hour turnaround requirements), alternative arrangements must be made by the CQCSM for sample collection and shipment or pickup.

Note: Overnight carriers usually will not accept responsibility for signing COC forms. Therefore, the Sampler shall sign, date, enter the time in the "Relinquished by" entry location of the COC form, place inside a zip-lock bag inside the sample container, and seal the container as specified in Section 6.4 - Sample Packaging.

6.6 GLOSSARY OF TERMS

<u>COC</u> - Chain-Of-Custody form

<u>Matrix</u> - The physical description of the medium being sampled e.g. soil (solid), aqueous (liquid)

<u>SOP</u> - Standard Operating Procedure

<u>QA</u> - Quality Assurance

<u>QC</u> - Quality Control

CQCSM – Contractor Quality Control System Manager

CQAB – Chemical Quality Assurance Branch

LIMS – Laboratory Information Management System

ATTACHMENT A

SAMPLE LABEL

NAME OF SAMPLING ORGANIZATION STONE & WEBSTER

SAMPLE DESCRIPTION GROUNDWATER FROM MONITORING WELL #1 AT BAINBRIDGE SITE

JOB #: 0141032

DATE: 11/2/92

TIME: 10:40

PRESERVATIVE: HCl

SAMPLED BY: DAVID JONES DJ

SAMPLE ID NO.: BA - MW01GW-XX

REMARKS

Title: Labeling, Packaging, and Shipping Environmental Samples

No.: SW-E/I-504-0

PAGE: Page 2 of 2

ATTACHMENT B

ATTACHMENT B

Inchcape Testing Services
Environmental Laboratories

55 South Park Drive
Colchester, VT 05446

TEL: (802) 655-1203
FAX: (802) 655-1248

COMPANY INFORMATION

Name: Stone & Webster
Address: 245 Summer St
Boston, MA
02210
Telephone: 617-589-1080
Facsimile: 617 589-2922
Contact Name: Tim Taylor

COMPANY'S PROJECT INFORMATION

Project Name: ANG-BURL
Project Number:
Sampler Name(s): Kevin Scully
Paul Graden

SHIPPING INFORMATION

Carrier:
Airbill Number:
Date Shipped:
Hand Delivered: ☐ yes ☐ no

INCHCAPE LABORATORY INFORMATION

Quote #:
Client Code:

VOLUME/CONTAINER TYPE/PRESERVATIVE (NOTE 4)

SAMPLE IDENTIFICATION (NOTE 1)	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS/REMARKS (NOTE 2,3)	1L / Amb GL / Cool	40 ML / GL / HCL	1L / Amb GL / Cool	500 ML / NM PL / Cool	500 ML / NM PL / Cool	/ /
EQ1	8/21/96	13:20	✓		A	8270	1	—	—	—	—	
MCW 101	8/22/96	0900	✓		A	8260	1	2 KS ~~1~~	—	—	—	
MCW 101	8/22	0910	✓		A	8270	—	—	1	—	—	
MCW 101	8/22	0920	✓		A	Total Metals - 6010 As, Pb, Cd only	—	—	—	1	—	
MCW 101 (B)	8/22	0925	✓		A	Dissolved Metals - 6010 As, Pb, Cd only	—	—	—	—	1	

NUMBER OF CONTAINERS

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kevin Scully	8/22/96	10:15	James P. Power
Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Relinquished by: (signature)	DATE	TIME	Received for Laboratory by: (signature)
	8/22/96	1130	[signature]

NOTES TO SAMPLER(S): (1) Limit Sample Identification to 6 characters, if possible; (2) Indicate designated Lab Q.C. sample and type (e.g.: MS/MSD/REP) and provide sufficient sample; (3) Field duplicates are separate sample; (4) e.g.: 40 ml/glass/H_2SO_4

Notes to Lab: (B) Filter Sample & Run dissolved metals - Do Immediately

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Cuttings and Fluids Management

SW-MWD-505-0

STANDARD OPERATING PROCEDURE **FUSRAP MAYWOOD SUPERFUND SITE** **STONE & WEBSTER ENGINEERING CORPORATION**		
TITLE: **Cuttings and Fluids Management**	**NO.:**	SW-MWD-505-0
	PAGE	1 of 4
	DATE:	May 1999

APPROVED:

____
Project Manager

____
Project Engineer

1.0 PURPOSE

This standard operating procedure (SOP) presents the management options for handling investigation-derived waste (IDW) at the FUSRAP Maywood Superfund site.

2.0 REFERENCES

U.S. Environmental Protection Agency, Region IV, Engineering Support Branch Standard Operating Procedure and Quality Assurance Manual, 1986.

U.S. Environmental Protection Agency, A Compendium Superfund Field Operations Methods, EPA/540/P-87/001.1, 1987.

U.S. Environmental Protection Agency, Guide to Management Investigation-Derived Wastes, 9345.3-03FS, January 1992.

3.0 APPENDICES

None.

4.0 GENERAL

4.1 DEFINITIONS

Hazardous Waste - Waste that is a RCRA regulated listed waste, or waste that exhibits ignitability, corrosivity, reactivity, or toxicity.

4.2 RESPONSIBILITIES

The Project Superintendent is responsible for ensuring that all investigation derived waste (IDW) procedures are conducted in accordance with this SOP. The Project Superintendent is also responsible for ensuring that handling IDW is in accordance with site-specific requirements as per the Maywood Environmental Protection Plan (EPP).

4.3 APPLICABILITY

Field investigation activities result in the generation of waste materials that may be characterized as hazardous waste. IDW may include drilling muds, cuttings, and purge water from test pit and well installation; purge water, soil, and other materials generated from collection of samples; residues from testing treatment technologies and pump and treat systems; contaminated personal protective equipment (PPE); and solutions (aqueous or otherwise) used to decontaminate non-disposable protective clothing and equipment. The management of IDW must comply with (or waive) regulatory requirements that are applicable or relevant and appropriate requirements (ARARs), such as the Land Disposal Restriction Regulations and treatability study exemptions.

4.4 REQUIRED EQUIPMENT

IDW Containers

5.0 PROCEDURES

During site investigations where materials are known (via field instrumentation or visual observation) or suspected (historic information) to be contaminated, sampling activity (i.e., soil boring or installation monitoring wells) will produce waste intrinsic to the site. The activities associated with disposition of this material must not contribute further to environmental degradation or pose a threat to public health or safety.

The three general options for managing IDW are (1) collection and on-site disposal; (2) collection and off-site disposal; and (3) collection and storage. The option selected should take into account the following factors:

- type and quantity of IDW (soil, sludge, liquid, debris)
- IDW minimization, and consistency with the IDW remedy and the site remedy

5.1 ON-SITE DISPOSAL

For the Maywood project, significant on-site disposal is not anticipated.

5.2 OFF-SITE DISPOSAL

5.2.1 Soil/Sludge/Sediment

Soil/sludge/sediment will be field characterized as per Section 2.5.1 of the Chemical Data Quality Management Plan (CDQMP). This characterization may be used to determine disposal options.

Before sending offsite to a TSDF, analysis is required. Also manifests may be required. Confirm that the TSDF and transporter are permitted for the respective wastes.

5.2.2 Aqueous Liquids

Aqueous liquids will be field characterized. This characterization may be used to determine disposal options.

When the final site remedy requires off-site treatment/disposal, the IDW may be stored (e.g., mobile tank or drums) or returned to its source until final disposal. The management option selected should take into account other relevant site-specific factors including weather, storage space, and public concerns/perceptions).

Before sending offsite to a TSDF, analysis is required. Also manifests may be required. Confirm that the TSDF and transporter are permitted for the respective wastes. See the Maywood Material Handling/Transportation and Disposal Plan (MHTD) for further details.

5.2.3 Disposable PPE

Field judgement on level of contamination will be made and an appropriate disposal method will be selected. If offsite disposal at a regulated facility is required, analysis of soil and water in contact with PPE may be used to determine disposal options.

5.3 INTERIM MEASURES

A. Storing IDW on-site until the final action may be practical in the following situations:

1. Returning wastes (especially sludges and soils) to their on-site source area would require reexcavation for disposal in the final remediation alternative.

2. Interim storage in containers may be necessary to provide adequate protection to human health and the environment.

3. Off-site disposal options may trigger land disposal regulations under RCRA. Storing IDW (e.g. drummed, covered in a waste pile) until the final disposal of all wastes from the site will eliminate the need to address this issue more than once. The management option selected should take into account relevant site-specific factors including weather, storage space, and public concerns/perceptions.

B. Segregate and containerize all waste for future treatment and/or disposal.

1. Containment options for soil/sludge/sediment includes drums or covered waste pile in area of concern.

2. Containment options for aqueous liquids include mobile tank or drums.

3. Containment options for PPE include drums or roll-off boxes.

6.0 RESTRICTED/LIMITATIONS

The Project Superintendent shall determine the most appropriate disposal option for aqueous liquids. Parameters to consider, especially in making the protectiveness decision, include the volume of IDW, the contaminants present in the groundwater, the presence of contaminants in the soil at the site, whether the groundwater or surface water is a drinking water supply, and whether the groundwater plume is contained or moving. Special disposal/handling may be needed for drilling fluids because they may contain significant components.

Decontamination

SW-MWD-506-0

STANDARD OPERATING PROCEDURE FUSRAP MAYWOOD SUPERFUND SITE STONE & WEBSTER ENGINEERING CORPORATION		
TITLE: Decontamination	NO.:	SW-MWD-506-0
	PAGE	1 of 8
	DATE:	September 1999

APPROVED:

____
Project Manager

____
Project Engineer

1.0 PURPOSE

To describe procedures for removing contamination from personnel and sampling equipment before and after sampling events at the FUSRAP Maywood Superfund Site. Decontamination is necessary to prevent spread of contaminants, to prevent cross-contamination of samples, and to protect the Safety and Health of site personnel.

2.0 SCOPE

This SOP provides information on the proper methods for decontamination of personnel and sampling equipment.

3.0 REFERENCES

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, DHHS (NIOSH) 85-115, October 1985.

Field Standard Operating Procedures (FSOP) 7, "Decontamination of Response Personnel", USEPA, January 1995.

29 CFR Part 1910, "Hazardous Waste Operations and Emergency Response", March 1989.

U.S. Environmental Protection Agency, Compendium of ERT Soil Sampling and Surface Geophysics Procedures, EPA/540/P-91/006, January 1991.

4.0 DEFINITIONS

None.

5.0 RESPONSIBILITIES

Personnel requirements for decontamination activities will vary depending upon the size and scope of the sampling effort. Designated field personnel are responsible for implementing all aspects of this SOP. In addition, all field activities must be carried out in accordance with a Maywood Site Safety and Health Plan (SSHP). Ensuring the fulfillment of the requirements of the SSHP is the responsibility of the Site Safety and Health Officer (SSHO) who may also perform sampling and decontamination activities.

6.0 PROCEDURE

6.1 APPLICABILITY

This procedure serves as guidance on the proper methods of decontaminating personnel and sampling equipment. These procedures can be modified or expanded to meet specific Maywood project requirements. Such changes should be documented with the task-specific Sampling and Analysis Plan or Safety and Health Plan.

6.2 EQUIPMENT AND MATERIALS

In selecting decontamination equipment, consider whether the equipment itself can be decontaminated for reuse or can it be easily disposed. The recommended equipment for decontamination of personnel, PPE, and equipment are:

- Appropriate personnel protective clothing (as required by HASP),
- Field Sampling Plan (FSP)
- Health And Safety Plan (HASP). **To be read and signed by all site personnel prior to site activities.**
- Field logbook(s)
- Non-phosphate detergent,
- Selected solvents (e.g., nitric acid (for non-metallic equipment only), acetone, hexane, or methanol), deionized water and tap water,
- Brushes,
- Spray bottles for solvents and water;
- Wash basins,
- Plastic sheets,

- Emergency eyewash bottle,
- Trash containers and paper towels,
- Aluminum foil and Plastic garbage bags,
- Storage containers (e.g. DOT approved 55 gallon drums and 5 gallon buckets with lids) for storage and disposal of contaminants and contaminated soils

Steam cleaning and pressure washing equipment may be used for larger equipment and vehicles.

Additional equipment necessary for decontaminating personnel vary depending upon the level of personnel protection clothing and equipment used onsite. These additional items are identified in relevant sections of this Standard Operating Procedure.

6.3 DECONTAMINATION FACILITY DESIGN

At a hazardous waste site, decontamination facilities should be located in the Contamination Reduction Zone (CRZ), i.e., the area between the Exclusion Zone (the contaminated area) and the Support Zone (the clean area) as described in the Maywood Site Safety and Health Plan.

6.4 PERSONNEL DECONTAMINATION

Four levels of personnel protection, as discussed in the PPE procedure, are available for use at any given site. The following is a description of the decontamination process for Level D and modified Level D.

- If required, an area will be designed for the removal of gloves and boot covers. Paper towels will be available for removal of this equipment.
- A trash barrel at the site will be provided for all disposable noncontaminated PPE. This material will be disposed of in a normal trash receptacle at the plant before leaving the site.
- Laundering of personal clothing should be completed as soon as possible once off-site.
- Soap and water will be used to wash hands before eating, drinking or smoking, and before using the bathroom facilities.

6.5 EQUIPMENT DECONTAMINATION

6.5.1 General

Adequate supplies of all materials must be kept on hand. This includes all rinsing liquids and other required materials.

6.5.2 Engineering Controls to Minimize Equipment Contamination

Whenever practical, employ engineering controls to either prevent or minimize the exposure of equipment to site contamination. Steps such as placing monitoring equipment in plastic bags, exposing only sampling ports or sensors to the environment can reduce or eliminate the need for decontamination. Once equipment is decontaminated, covering equipment with an impermeable, strippable coating (e.g. aluminum foil) will maintain cleanliness for the next use.

6.5.3 Material Compatibility

The substances chosen for equipment decontamination must be effective in removing the known or suspected site chemicals of concern.

> The chemical and physical compatibility of the decontamination solutions or other decontamination materials to both each other and the chemicals of concern must be determined before they are used. **Any decontamination method that: 1) poses a direct health hazard to workers (e.g., vapors form chemical decontamination solutions may be hazardous if inhaled, or they may be flammable); or 2) permeates, degrades, damages or otherwise impairs the safe functioning of the PPE is incompatible with such PPE and should not be used.**

6.5.4 Decontamination Facility Design

At a hazardous waste site, decontamination facilities should be located in the Contamination Reduction Zone (CRZ), i.e., the area between the Exclusion Zone (the contaminated area) and the Support Zone (the clean area). Refer to your site Health and Safety Plan for your site-specific requirements.

The extent of known contamination will determine to what extent equipment needs to be decontaminated. If the extent of contamination cannot be determined, cleansing should be done assuming that the equipment is highly contaminated until enough data are available to allow asessment of the actual level of contamination.

The following general decontamination principles should be considered when laying out the physical arrangement of the decontamination line:

- The decontamination method selected must be effective for the known or suspected chemicals of concern; and

- The decontamination process should consist of a series of steps performed in a specific sequence, each step performed at a separate station in order to prevent cross contamination, with the stations preferably arranged in a straight line.

- All decontamination workers must be decontaminated before entering the clean Support Zone. Refer to SOP - **Personal Protection Equipment Decontamination** and your HASP for your site safety issue considerations.

Site-specific factors that affect the decontamination facility design must be considered. The following are the typical factors for consideration.

- Proximity to work areas, water supplies, and contaminated material staging areas.
- The potential for, exposure based on assigned worker locations, duties, activities and functions.
- The chemical, physical, and toxicological properties of the wastes.
- The movement of personnel and/or equipment among different zones.
- Contingency plans for emergencies
- The methods available for protecting workers during decontamination.

6.5.5 Standard Procedure for Small Equipment Decontamination

The 9-step decontamination procedure listed below is the generic standard procedure for small equipment (e.g. split spoons, hand augers, bailers, etc.) decontamination which combines both physical and chemical removal steps. This procedure may be modified to address site-specific chemicals of concern and media being sampled. Solvent rinses are not necessarily required when organics are not a contaminant of concern and may be eliminated from the sequence specified below. Similarly, an acid rinse is not required if analysis does not include inorganics.

- Remove any solid particles from the equipment or material by brushing and then rinsing with available tap water. This initial step is performed to remove gross contamination.
- Wash equipment with a non–phosphate detergent solution.
- Rinse with distilled/deionized water.
- If metals are among site chemicals of concern - Rinse with 10% nitric acid and then rinse with distilled/deionized water. If no samples are being collected for metals analysis, skip this step.
- Use the appropriate solvent rinse(s) if the sample will be analyzed for organics. Refer to Attachment 1 for the appropriate decontamination steps for the known or suspected chemicals of concern cross-referenced by EPA SW 846 analytical numbers. **The decontamination procedure for EPA Method 8270 shall be employed as the organic compound decontamination procedure if samples are being collected for more than one type of organic analysis.**

- Air dry the equipment completely.
- Rinse again with distilled/deionized water.
- Dispose of all rinse and decontamination fluids in an appropriate manner in accordance with specifications in the Remedial Action Work Plan.

Sampling equipment that requires the use of plastic tubing should be disassembled and the tubing replaced with clean tubing, before commencement of sampling and between sampling locations.

6.5.6 Standard Procedure for Large Equipment Decontamination

Steam cleaning is the method of choice for large equipment decontamination. The pressurized fluid stream provides effective physical contaminant removal that can be rapidly applied to both large areas and small, hard to reach areas. Detergents and water soluble solvents such as isopropanol can be added to the steam cleaning water reservoir as required for the chemicals of concern. The use of this procedure does require the use and/or construction of containment devices for the capture of the solids and rinsates generated during the process. Tubs such as plastic wading pools can be placed under smaller equipment to catch runoff.

The decontamination process for larger equipment such as drilling rigs require the construction of containment areas to capture the runoff. The design of this containment area can be as simple or as elaborate as frequency-of-use and chemicals of concern dictate. A simple containment area can be constructed from landscaping timbers and a waterproof pool tarp. A sloped, hard surface such as a paved portion of parking lot should be used to keep the tarp from tearing due to differential settling of the heavy equipment. The landscaping timbers should be arranged in a squared off "U" with the open side on the uphill side of the area. The "U" structure should be wide enough to allow decontamination workers to move freely around the equipment being decontaminated. The tarp is then draped over the timbers and pulled in tight against the inside side of the landscaping timbers to form a flat working area. Heavy duty staples can be used to secure the tarp to the outer sides of the landscaping timbers The heavy equipment or portion (such as the bucket of an excavator) that requires decontamination is placed in the area and steam cleaned as appropriate. Drill rigs are usually backed in since the rear of the truck normally requires the most decontamination. The solids and rinsate from the cleaning process will accumulate on the lower side of the tarp. Liquids can be bailed or pumped (using a sump pump) into the appropriate drum or tank. Solids can be shoveled into the appropriate drum or roll-off container. Plastic "walls" can be erected using wooden frames should more complete spray containment be required.

Should site conditions or traffic volume require, a more elaborate decontamination facility can be constructed by digging a sloped excavation, placing an impermeable liner and sump pump, and backfilling with gravel. The vehicles requiring decontamination can then be driven on from one end, cleaned, and driven out the other side.

It should be noted that steam cleaning can create exposure conditions for workers due to both splashing and inhalation. Refer to your health and safety plan for proper personal protection requirements.

6.5.7 Sanitizing Procedures

Reusable clothing and other personal articles must be decontaminated and sanitized before reuse. If practical, reusable protective clothing should be machine washed after a thorough decontamination. Otherwise, clean the clothing by hand.

6.6 QUALITY ASSURANCE

The effectiveness of any decontamination method used at a site should be assessed at the beginning of a project periodically throughout the life of a project. Visual observation, equipment blanks, and wipe sampling are the typical methods that can be employed to determine the effectiveness of decontamination. Equipment blanks are collected by capturing analyte free water which is poured over sampling equipment after decontamination. These samples are normally included in the task-specific SAP as part of the project Quality Control program. Refer to your Field Sampling Plan for equipment blank collection frequency.

The Site Safety & Health Officer shall monitor project procedures to determine their effectiveness.

The Project Chemist shall monitor the effectiveness of decontamination procedures by evaluating the results of equipment rinsate blanks. Equipment rinsate blanks are samples of analyte-free water that are brought into contact with decontaminated equipment prior to collection in sample bottles. If contaminants of concern are detected when equipment blanks are analyzed, insufficient equipment decontamination is indicated and procedures shall require modification.

If a decontamination method is not considered effective, the decontamination program must be revised.

Visual observation, wipe sampling, cleaning solution analysis, and permeation testing are the typical methods used to determine the effectiveness of decontamination.

6.7 DISPOSAL METHODS

All equipment used for decontamination must be decontaminated and/or disposed of properly. Buckets, brushes, PPE, tools, and other contaminated equipment should be collected, placed in containers, and labeled. All spent solutions and wash water should be collected and disposed of properly. PPE that is not completely decontaminated should be placed in plastic bags, pending further decontamination and/or disposal. Refer to SW-MWD-505-0, Cuttings and Fluids Management, for specific instructions regarding the handling and disposition of these materials.

7.0 ATTACHMENTS

Attachment 1 - DECONTAMINATION FOR ORGANICS BY ANALYTICAL METHOD

EPA ANALYTICAL METHOD NUMBER	DECONTAMINATION STEPS
8010 **HALOGENATED VOLATILES**	1. Rinse with mixture of 90% Hexane and 10% Ethyl Acetate 2. Rinse with solution of 90% Ethyl Acetate and 10% Isopropanol 3. Rinse with distilled/deionized water
8015 **NON-HALOGENATED VOLATILES**	1. Rinse with Isopropanol
8020 **AROMATIC VOLATILES**	1. Rinse with mixture of 90% Hexane and 10% MIBK 2. Rinse with Isopropanol 3. Rinse with distilled/deionized water
8080/8081 **ORGANOCHLORINE PESTICIDES/PCB**	1. Rinse with mixture of 90% Hexane and 10% Ethyl Acetate 2. Rinse with solution of 90% Ethyl Acetate and 10% Isopropanol 3. Rinse with distilled/deionized water
8100 **TOTAL PETROLEUM HYDROCARBONS**	1. Rinse with mixture of 90% Hexane and 10% Ethyl Acetate 2. Rinse with Isopropanol 3. Rinse with distilled/deionized water
8150 **CHLORINATED HERBICIDES**	1. Rinse with mixture of 90% Hexane and 10% Ethyl Acetate 2. Rinse with Isopropanol 3. Rinse with distilled/deionized water
8240/8260 **VOLATILE ORGANICS**	1. Rinse with mixture of 90% Hexane and 10% Ethyl Acetate 2. Rinse with Isopropanol 3. Rinse with distilled/deionized water
8250/8270 **SEMIVOLATILE EXTRACTABLE ORGANICS**	1. Rinse with mixture of 90% Hexane and 10% Ethyl Acetate 2. Rinse with solution of 90% Ethyl Acetate and 10% Isopropanol 3. Rinse with distilled/deionized water

Field Notebook Content and Control

SW-MWD-507-0

	STANDARD OPERATING PROCEDURE **FUSRAP MAYWOOD SUPERFUND SITE** **STONE & WEBSTER ENGINEERING CORPORATION**		
TITLE: **Field Notebook Content and Control**	**NO.:**	SW-MWD-507-0	
	PAGE	1 of 8	
	DATE:	May 1999	

APPROVED:

____
Project Manager

____
Project Engineer

1.0 PURPOSE

The objective of this Standard Operating Procedure (SOP) is to set criteria for content entry and form of field notebooks for the FUSRAP Maywood Superfund Site.

2.0 SCOPE

This procedure presents the proper methods of using and maintaining field notebooks for site operations for the Maywood Project.

3.0 REFERENCES

Nielsen Environmental Field School, Field Notebook Guidelines, 1997.

4.0 DEFINITIONS

Biota - The flora and fauna of a region.

Decontamination - To remove contaminants from field sampling equipment that might bias analytical results.

5.0 RESPONSIBILITIES

5.1 Project Manager

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified to perform required work.

5.2 Project Engineer

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for the task.

5.3 Site Safety and Health Officer

All field activities must be carried out in accordance with the SSHP. The Site Safety and Health Officer is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.4 Project Superintendent

The Project Superintendent is the individual designated by the Project Manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed on maintenance of the field notebook in accordance with the project requirements, this SOP, and related SOPs. He or she assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin, and that all necessary personnel are mobilized on time. The Project Superintendent maintains a daily log of activities each work day.

The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected encounters during field investigations and deviations from this SOP.

5.5 Site Personnel

Site personnel assigned to maintain the field notebook will be trained in the proper techniques for conducting the work. They are required to read and sign the site-specific SSHP and to follow the procedures in this SOP, unless superseded by other project-specific requirements. All site operations, including deviations to SOPs, will be recorded in field notebooks during on-site activities.

6.0 <u>PROCEDURES</u>

6.1 General

Each site or operation, as applicable, will have one current site logbook, which will serve as an index of all activities performed at the site. It is initiated at the start of the first on-site activity (e.g., initial reconnaissance survey). Summary entries are made for every day that on-site activities take place. The details of all field activities shall be recorded in a separate field notebook. These field notebooks and the site logbook shall be made part of the project files.

Information recorded in field notebooks include observations, data, calculations, time, weather, description of the data collection activity, methods, instruments, and results. Additionally, the field notebook may contain descriptions of wastes, biota, geologic material, and site features including sketches, maps, or drawings as appropriate.

6.2 Equipment and Materials

- Site logbook
- Site-specific plans
- Hard-covered, waterproof field notebook(s)
- Indelible black ink pen
- Ruler or similar scale (in some circumstances)

6.3 Preparation

In addition to this SOP, site personnel responsible for maintaining field notebooks must be familiar with other SOPs pertinent to the task at hand. These should be consulted as necessary to obtain specific information about equipment and supplies, health and safety, sample collection, packaging, decontamination, and documentation.

The field notebook is assigned to an individual responsible for its care and maintenance.

Field notebooks shall be bound with lined, consecutively numbered pages. All pages must be numbered prior to initial use of the field notebook. The following information shall be recorded inside the front cover of the field notebook:

- Person and organization to whom the book is assigned, and phone number(s)
- Start date
- Project Name
- Stone & Webster Job Number
- Project Superintendent's Name
- Sequential Book Number (if applicable)

The first five pages of the field notebook shall be reserved for a table of contents. Mark the first page with the heading and enter the following:

TABLE OF CONTENTS

The remaining pages of the Table of Contents will be designated as such with "TOC" written on the top center of each page.

6.4 Operation

The following is a list of requirements that must be followed when using a field notebook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the field notebook. If data-collection forms are specified by an activity-specific work plan, this information need not be duplicated in the field notebook. However, any forms used to record site information must be referenced in the field notebook.
- Information should be factual and unbiased.
- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.
- Write in black, indelible ink. Do not write in pencil unless working in wet conditions.
- Do not erase or blot out any entry at any time. Before an entry has been signed and dated, changes may be made but care must be taken not to obliterate what was written originally. Indicate any deletion by a single line through the material to be deleted. A change should be initiated and coded using one of the common data error codes shown in Table 1. All error codes should be circled.
- Do not remove any pages from the book.
- Do not use loose paper and copy into field notebook later.
- Record as much information as possible.
- All entries should be neat and legible.

Specific requirements for field notebook entries include:

- Initial and date each page.
- Sign and date the final page of entries for each day.
- Initial and date all changes.
- Multiple authors must sign out the field notebook by inserting the following:

  Above notes authored by:
  ______________________________ (Sign name)
  ______________________________ (Print name)
  ______________________________ (Date)

- A new author must sign and print his/her name before additional entries are made.
- Draw a diagonal line through the remainder of the final page at the end of the day.
- Record the following information on a daily basis:

  a) Date and time
  b) Name of individual making entry
  c) Description of activity being conducted including station (i.e., well, boring, sampling, location number) if appropriate
  d) Unusual site conditions
  e) Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
  f) People on site
  g) Level of personnel protection to be used
  h) Arrival/departure of site visitors
  i) Arrival/departure of equipment
  j) Sample pickup (chain-of-custody form numbers, carrier, time)
  k) Sampling activities/sample logsheet numbers
  l) Start or completion of borehole/trench/monitoring well installation or sampling activity
  m) Health and Safety issues
  n) Instrumentation calibration details

Entries into the field notebook shall be preceded with the time of the observation. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged. All measurements made and samples collected must be recorded unless they are documented by automatic methods (e.g., data logger) or on a separate form required by an operating procedure. In these cases, the field notebook must reference the automatic data record or form.

While sampling, record observations such as color and odor. Indicate the locations from which samples are being taken, sample identification numbers, the order of filling bottles, sample volumes, and parameters to be analyzed.

A sketch of the station location may be warranted. All maps or sketches made in the field notebook should have descriptions of the features shown and a direction indicator. It is preferred that maps and sketches be oriented so that north is towards the top of the page.

Other events and observations that should be recorded include (but are not limited to):

- Changes in weather that impact field activities
- Subcontractor activities
- Deviations from procedures outlined in any governing documents. Also record the reason for any noted deviation.
- Problems, downtime, or delays.
- Upgrade or downgrade of personnel protective equipment.

6.5 Post-Operation

To guard against loss of data due to damage or disappearance of field notebooks, copies of completed pages shall be periodically and securely stored by the project. Documents which are separate from the field notebook shall be copied and submitted regularly and as promptly as possible to the project files. This includes all automatic data recording media (print-outs, logs, disks or tapes) and activity-specific data collection forms required by other SOPs.

At the conclusion of each activity or phase of site work, the individual responsible for the field notebook will ensure that all entries have been appropriately signed and dated, and that corrections were made properly (single lines drawn through incorrect information, then initialed, coded, and dated). The completed field notebook shall be submitted to the project records file.

7.0 RESTRICTIONS/LIMITATIONS

Field notebooks constitute the official record of on-site technical work, investigations, and data collection activities. Their use, control, and ownership is restricted to activities pertaining to specific field operations carried out by Stone & Webster personnel and their subcontractors. They are documents that may be used in court to indicate and defend dates, personnel, procedures, and techniques employed during site activities. Entries made in these notebooks should be factual, clear, precise, and as non-subjective as possible. Field notebooks, and entries within, are not to be utilized for personal use.

TABLE 1 COMMON DATA ERROR CODES

RE	Recording Error
CE	Calculation Error
TE	Transcription Error
SE	Spelling Error
CL	Changed for Clarity
DC	Original Sample Description Changed After Further Evaluation
WO	Write Over
NI	Not Initialed and Dated at Time of Entry
OB	Not Recorded at the Time of Initial Observation

All Error Codes should be circled

Procedure for Shipping Radiologically Contaminated Environmental Samples

SW-MWD-508-0

STANDARD OPERATING PROCEDURE FUSRAP MAYWOOD SUPERFUND SITE STONE & WEBSTER ENGINEERING CORPORATION		
TITLE: **Procedure for Shipping Radiologically Contaminated Environmental Samples**	NO.:	SW-MWD-508-0
	PAGE	1 of 4
	DATE:	May 1999
APPROVED: ________________________ Project Manager ________________________ Project Engineer		

1.0 PURPOSE

This procedure presents the proper method for shipping low level radiologically contaminated environmental samples at the FUSRAP Maywood Superfund Site.

2.0 SCOPE

This procedure applies to excepted packages for limited quantities of radioactive materials as defined in 49 CFR 173.421.

3.0 REFERENCES

49 CFR Parts 171 and 173 of the Transportation Regulations

4.0 DEFINITIONS

None

5.0 RESPONSIBILITIES

5.1 Project Manager

Sets technical capability requirement criteria for personnel and ensures that personnel assigned to project tasks are properly qualified to perform required work.

5.2 Project Engineer

Translates client's requirements into technical direction of project. Reviews and approves technical progress, ensures that the Project Superintendent has been properly briefed and is prepared for the task.

5.3 Site Safety and Health Officer

All field activities must be carried out in accordance with a site-specific SSHP. The Site Safety and Health Officer is responsible for ensuring that all site workers (Stone & Webster and subcontractors) have read, signed and are familiar with the requirements of the SSHP and that the requirements of the SSHP are met during site activities.

5.4 Project Superintendent

The Project Superintendent is the individual designated by the Project Manager to supervise investigative activities by Stone & Webster and related subcontracting personnel at a given site for the designated tasks. The Project Superintendent is responsible for ensuring that the field personnel have been briefed on shipping samples in accordance with the project requirements, this SOP, and related SOPs. He or she assures that all necessary equipment including safety equipment is available and functioning properly before project operations begin, and that all necessary personnel are mobilized on time. The Project Superintendent maintains a daily log of activities each work day.

The Project Superintendent coordinates and consults with the Project Manager on decisions relative to unexpected encounters during field investigations and deviations from this SOP.

5.5 Site Personnel

Site personnel assigned to ship radiologically contaminated environmental samples will be trained in the proper techniques for conducting the work. They are required to read and sign the site-specific SSHP and to follow the procedures in this SOP, unless superseded by other project-specific requirements. All shipping activities, including deviations to this SOP, will be recorded in field logbooks during on-site activities.

6.0. PROCEDURES

This section outlines the method for shipping limited quantities of radioactive materials as defined in 49 CFR 173.421.

6.1 Determining if the Package is an Excepted Package for Limited Quantities of Radioactive Materials

A package can be shipped as an excepted package for limited quantities of radioactive materials if the following requirements are met:

1) The activity does not exceed the limits specified in 49 CFR 173.421.
2) The package meets the general design requirements specified in 49 CFR 173.410.
3) The exposure rate at any point on the external surface of the package does not exceed 0.5 mR/hour.
4) The removable radioactive surface contamination on the external surface of the package does not exceed 22 dpm/cm^2 for beta, gamma, and low toxicity alpha emitters, or 2.2 dpm/cm^2 for all other alpha emitting radionuclides.
5) The package does not contain more than 15 grams of ^{235}U.

6.2 Package Shipment

Package shipment consists of the following steps:

1) A cooler which conforms to the general design requirements in 49 CFR 173.410 will be used for shipment. Prior to shipment, the cooler must be prepared so that no leakage during shipment can occur. All valves on the cooler will be securely duct taped, both inside and outside the cooler and the cooler will be lined with either plastic or a large garbage bag.

2) All sample bottles will be placed in separate zip-lock bags before being placed in the cooler.

3) When placing sample bottles in the cooler, the less contaminated samples will be placed toward the outside of the cooler, and the more contaminated samples will be placed near the center of the cooler. Packing material will be placed above and below the samples.

4) When shipping more than one cooler, the more highly contaminated samples will be distributed among several coolers.

4) After the cooler is filled, the plastic or garbage bag will be closed and securely taped. A sticker which reads "Radioactive" will be placed on the outside of the garbage bag (or plastic).

5) A notice with the following information will be placed inside a zip-lock bag and taped to the inside of every cooler:

"This package conforms to the conditions and limitations specified in 49 CFR 173.421 for excepted radioactive materials, limited quantity, N.O.S., UN 2910. If you have questions, call ________." (The cosigner's or consignee's name, address, and phone number will follow this statement.)

6) Once the cooler is completely packed, the outside of the cooler will be thoroughly wiped with damp paper towels. The cooler will then be scanned with a sodium iodide (NaI) 1" x 1" detector to ensure that the exposure rate along the external surface of the package does not exceed 0.5 mR/hour. All external surfaces of the cooler will be scanned including the top, sides, and bottom.

7) If the exposure rate at the surface of any cooler exceeds 0.5 mR/hour, the cooler will be repacked with additional packing material and/or the samples bottles will be further segregated so that more highly contaminated samples are placed into separate coolers. If the surface activity still exceeds 0.5 mR/hour, the cooler will not be shipped and the company health physicist will be consulted for assistance.

Requirements for the Preparation of Sampling and Analysis Plans

Sections E and F of EM 200-1-3

APPENDIX B

SECTIONS E AND F OF EM 200-1-3 REQUIREMENTS FOR THE PREPARATION OF SAMPLING AND ANALYSIS PLANS

APPENDIX B

SECTIONS E and F of EM 200-1-3
REQUIREMENTS for the PREPARATION of SAMPLING and ANALYSIS PLANS

Appendix E
Sample Manipulation Instructions

E-1. Filtration Techniques (Liquid Media)

a. Scope and application. This section outlines two different techniques for the filtration of liquid media (i.e., groundwater, surface water, and potable water). The procedures will address in-line filtration, where the filter assembly is under positive pressure, and vacuum filtration, where the filter assembly is under negative pressure. In addition, the procedures describe and recommend specific filtration equipment. Filtration of aqueous samples is performed when the removal of silt, algae, particulates, and other debris is desired. Predominantly, filtration is employed when water samples are to be tested for dissolved metals. Filtered samples for metals (dissolved fraction) should be analyzed in conjunction with non-filtered samples to determine the metal concentration in solution versus metals associated with solids. Analysis of both filtered and unfiltered samples will allow the determination of metal concentration associated with the solid. Filtration should not be conducted in conjunction with organics analysis.

b. Filtration techniques. The following instructions will focus on positive and negative pressure filtration of aqueous media. In the instructions, specific types of filtration devices will be referenced. Because most filtration will be for the purpose of determining "dissolved" versus total metals, these instructions assume a filter pore size of 0.45 µm. Analytical methods used to determine dissolved metal concentrations have historically used 0.45-µm filters to separate dissolved and particulate phases. Filters less than 0.45 µm may be necessary in certain circumstances.

(1) Positive pressure filtration. Aqueous samples that may require positive pressure filtration include groundwater samples, surface water samples, and potable water supply samples. To filter an aqueous sample using the positive pressure technique, a pump, filter, and tubing are required. The following are examples of equipment that may be used for positive pressure in-line filtration.

(a) Pump:
Pump System
High Flow Range: 3 - 2,300 mL/min
Low Flow Range: 06 - 460 mL/min
System Flow Control: ± 10%

(b) Filter assembly:
Groundwater Sampling Capsule
0.45-µm pore size
1/4" - 1/2" tapered barb fitting
Continuous Use Pressure: 60 psi @ Ambient
Maximum Momentary Pressure: 100 psi @ Ambient

(c) Filtration procedure.

- Use polytetraflouroethylene (PTFE). (PTFE is commonly referred to using the registered name of Teflon) tubing for pump and filter connections.
- Connect the 0.45-µm in-line filter to the discharge tubing from the pump. Make sure the flow arrow on the filter is pointing in the correct direction.
- Apply pressure to the liquid sample (via pump) to force it through the filter into a sample container.
- Replace the in-line filter when the flow becomes too restricted because of buildup on the filter. To replace the filter:
  - Discontinue pumping (turn off pump).
  - Relieve the pressure in the system (line between the pump and the filter).
  - Disconnect the filter and replace with a new one.

(2) Negative pressure filtration. Aqueous samples which may require negative pressure filtration include groundwater samples, surface water samples, and potable water supply samples. To filter an aqueous sample using the negative pressure technique, a pump, filter, sample collection container, and tubing are required. The following equipment may be used for negative pressure (vacuum) filtration:

(a) Pump:
Hand-Operated Vacuum/Pressure Pump
Maximum Vacuum: 25-in. Hg
Maximum Pressure: 15 psi
Composition: Metal or PVC

(b) Filter Assembly:
Nalgene Filter Funnel/Collection Flask
Filter Composition: Cellulose nitrate

The volumes of samples collected from waste sources at hazardous waste sites or samples from sources that are known to be toxic should be kept to an absolute minimum since disposal costs of excess sample material are high. The laboratory or project personnel may require that excess sample volume be returned to the site because of the hazardous nature of the samples or because of sensitive political issues surrounding the project. If samples are being collected for bench scale or pilot scale remediation studies, larger volumes may be necessary. This scenario normally involves sending large bulk volumes to a laboratory to undergo various applications/manipulations to identify the optimum conditions for remediation of a particular waste stream. The ultimate data user (design engineer) or laboratory should be contacted to determine the volume of material required.

Analysis/Site Condition	Preferred Material
Metals	Glass or PTFE
Organics	Stainless steel, glass, or PTFE
Corrosive Soil/Waste	Glass or PTFE

(3) Aqueous samples. Aqueous samples are typically homogenous because of the physical properties of water, such as diffusion and the ability to flow and freely mix. Therefore, aqueous samples do not require mixing. However, viscous or semi-solid liquids will require mixing. These samples can be shaken well to mix or stirred thoroughly with a tool of appropriate composition. The sampler may encounter contaminants that are not miscible with water and will separate into distinct phases. In these situations, it is advisable to collect a sample from each layer/phase as well as a homogenized sample. When multiple phases are sampled, the sample should be homogenized in the laboratory to achieve the most homogenous sample. Water samples (potable well, monitoring well, surface water) should be obtained by alternately filling sample containers from the same sampling device for each parameter. Split and duplicate samples will be collected simultaneously with the primary samples. Containers for volatile organic analyses (VOA) will be filled first, followed by containers for semivolatile organics, metals, cyanide, and water quality parameters. Each VOA container should be completely filled immediately, rather than splitting the water between bottles and filling the bottles incrementally. The containers will all be filled from the sampling device if possible. If this is not possible, a minimum of two containers (one for the primary sample and one for the split sample) will be filled from each sampling volume. If more than two containers can be filled from one sampling volume, the number of containers filled must be an even number (i.e., 2 or 4) so that an equal number of containers for the primary and split samples are prepared. The remaining portions of the sample will then be prepared by splitting each sampling volume between containers for the primary and split samples.

(4) Solid samples. Obtaining samples in a soil or sediment matrix requires homogenization of the sample aliquot prior to filling sample containers. However, volatile organic samples are the exception: samples being analyzed for volatile organic compounds (VOCs) must always be taken from discrete locations prior to mixing. This practice is necessary to prevent loss of volatile constituents and to preserve, to the extent practicable, the physical integrity of the volatile fraction. Homogenization of the sample for remaining parameters is necessary to create a representative sample volume. Moisture content, sediments, and waste materials may inhibit the ability to achieve complete mixing prior to filling sample containers. Therefore, it is extremely important that soil samples be mixed as thoroughly as possible to ensure that the sample is as representative as possible of the sample location. Homogenization should be accomplished by filling a properly decontaminated stainless steel tray or bowl with the sample and mixing it with a decontaminated stainless steel or PTFE instrument. The method of choice for mixing is referred to as quartering and can be performed in a bowl or tray of an appropriate material (material depends on the parameters to be analyzed for). The soil in the sample pan is divided into quarters. Each quarter is mixed, then all quarters are mixed into the center of the pan. This procedure is followed several times until the sample is adequately mixed. If round bowls are used for sample mixing, adequate mixing is achieved by stirring the material in a circular fashion and occasionally turning the material over. The extent of mixing required will depend on the nature of the sample and should be done to achieve a consistent physical appearance prior to filling sample containers. Once mixing is completed, the sample should be divided in half and containers should be filled by scooping sample material alternately from each half.

c. Potential problems.

(1) The higher the moisture content, the more difficult it is to homogenize the sample.

(2) A true homogenization of soil, sediment, or sludge samples is almost impossible to accomplish under field conditions.

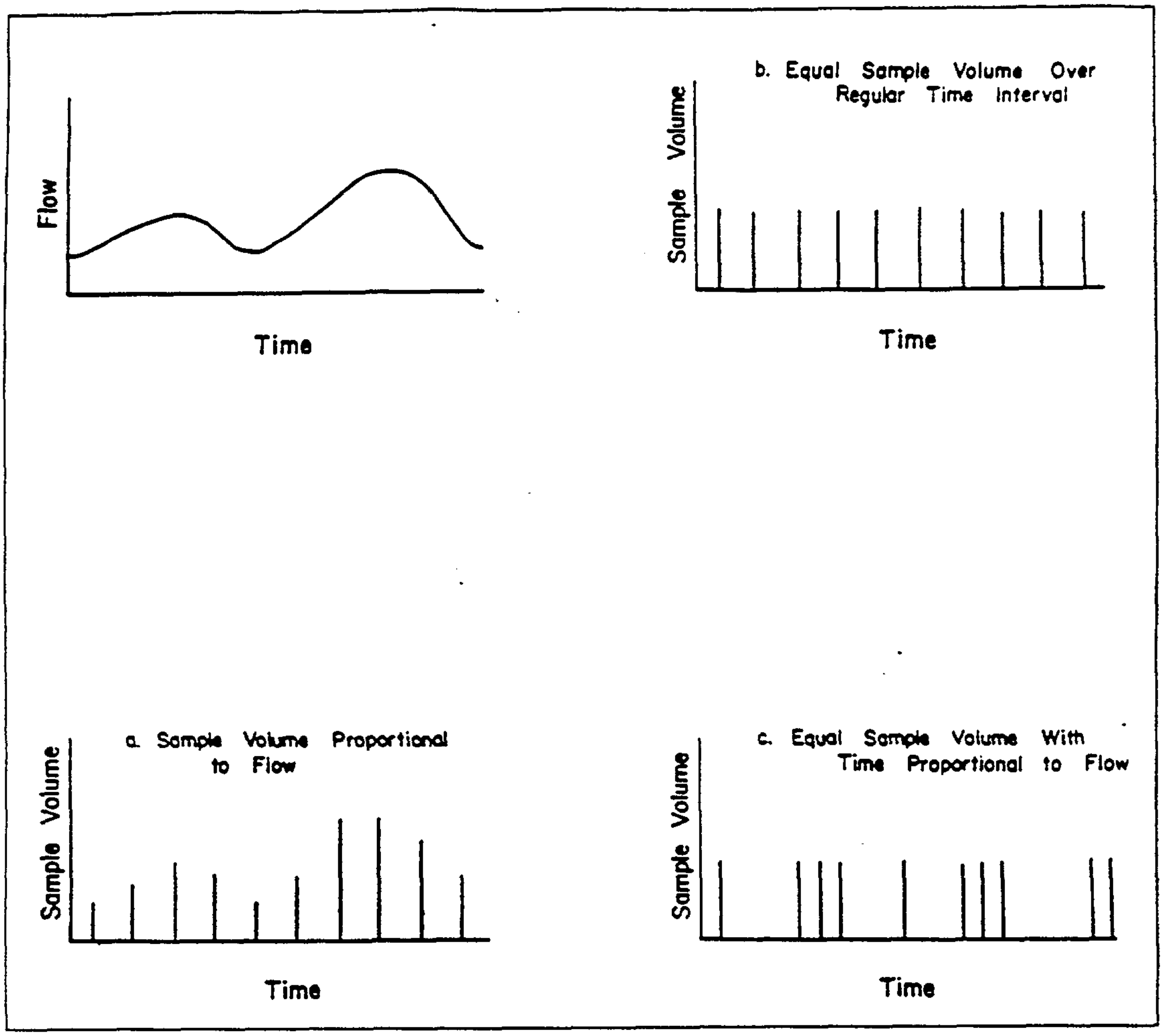


Figure E-1. Composite sampling methods

(b) Homogenize individual grab samples as outlined in Instruction E-2, and place them into proper sample containers.

(c) Assemble the sample containers that contain the grab samples that will make up a specific composite sample.

(d) Remove an aliquot of sample from each sample container and place it into a clean stainless steel mixing bowl. Each aliquot amount is to be as identical as possible to facilitate representativeness. Avoid generating excess contaminated soil when possible.

(e) Homogenize the aliquots as described in Instruction E-2.

(f) Remove sample amounts from the homogenized composite sample and place them into the proper containers for shipment to the laboratory.

is critical that submitted samples be visually inspected for homogenization prior to sub-sampling. Laboratory personnel should document the physical appearance of samples upon receipt, including comments about settling and phase separation. Techniques used to homogenize or re-homogenize samples should also be documented. The approaches to sub-sampling techniques are distinguished by the analytical requirements for the state or condition of the aliquot to be tested. There are two main approaches to sub-sampling that are dependent upon the need for undisturbed versus disturbed samples. For example, although homogenization is critical prior to sub-sampling for suspended solids analyses, homogenization prior to sub-sampling may also release volatile constituents resulting in inaccurate organic analyses. The first approach is relevant for samples that are analyzed for volatile organics or other constituents that require an undisturbed sample. Disturbing these types of samples via mixing, blending, homogenizing, shaking, or stirring may alter the physical/chemical state of the sample and cause a release or alteration of the contaminant of concern and a misleading final analytical result. The second approach is relevant to other analyses that require thorough homogenization prior to sub-sampling. Without some type of mixing, blending, homogenizing, shaking, or stirring operation for these samples, the final analytical results would be questionable.

(1) Procedure.

(a) Solid matrix. Solid matrix samples are to be sub-sampled as follows:

- Allow the sample and container to equilibrate to room temperature before opening the container.

- Visually inspect and document the appearance of the sample prior to sub-sampling. If the subsequent analysis requires an undisturbed sample, no homogenization is performed and the materials are ready for sub-sampling. If the subsequent analysis does not require an undisturbed sample, the entire sample contents should be removed and the sample homogenized regardless of visual observation. Sieving, if necessary, should be conducted after homogenization. To prepare the sub-sample, the sample should be subdivided (quartered) and approximately equal portions removed from each quarter of the sample for inclusion into a final sample aliquot that will undergo analysis.

- For samples that are analyzed for volatile organics or other constituents that require an undisturbed sample, a clean hand core sampler, or similar sampling device, should be used to remove a vertical core segment/aliquot of material from the sample.

- For samples that are analyzed for volatile organics or other constituents that require an undisturbed sample, the sample should be removed from the coring device into a clean, glass beaker or similar container from which a portion can be accurately weighed and analyzed.

- For other sample analyses that require homogenization prior to sub-sampling, the entire aliquot generated from subdivisions in the second step should be accurately weighed in a clean glass beaker or similar container and analyzed. Alternatively, if only a portion of the composited aliquot generated in the second step will be used for subsequent analysis, the subdivisions should be sampled equally into a clean glass beaker or similar container from which a portion can be accurately weighed and analyzed.

(b) Liquid matrix. Liquid matrix samples are to be sub-sampled as follows:

- Allow the sample and container to equilibrate to room temperature. If volatile organic analyses are not required, the container may be opened following temperature equilibration.

- Visually inspect and document the appearance of the sample for homogeneity. This may not be possible due to the container material (i.e., amber glass). If, upon inspection, it is discovered that the sample has more than one liquid phase, consult with the client to determine sampling needs.

- If no phase separation exists, homogenize the sample by shaking well to mix. If the liquid is very viscous, the sample may require stirring (i.e., glass or PTFE stirring rod).

- Depending on the analytical method to be employed, sub-sampling should follow the following approach if the entire sample is to be used (e.g., pesticides, polychlorianted biphenyls (PCBs), semivolatile organics, polycyclic aromatic hydrocarbons (PAHs), etc.). In the preferred method for transferring the entire sample contents, the analyst first marks the water level on the sample container, and then, after shaking, pours the entire contents of the container into the extraction

Table E-1
Procedure Clarifications/Exceptions

	Detergent Wash	Tap Water	Acid Rinse	Tap Water	Solvent Rinse[1]	Deionize Water	Air Dry
VOA Low MW CMPDS[2]	✓	✓			Methanol	✓	✓
BNA PEST/ PCBS High MW CMPDS[2]	✓	✓			Hexane	✓	✓
Organic Bases [3]	✓	✓	(dil.acid) 1% Sol.	✓	Iso-propyl Alcohol	✓	✓
Organic Acids [4]	(dil.base) ✓	✓			Iso-propyl Alcohol	✓	✓
Trace Metals	✓	✓	10% Sol.	✓		✓	✓
Salts	✓	✓				✓	✓
Acidic CMPDS	(dil.base) ✓	✓				✓	✓
Basic CMPDS	✓	✓	(dil.acid) 1% Sol.	✓		✓	✓
caustic							

[1] Solvent rinses vary in polarity which leads to varying solubilizing properties. Deciding appropriate solvent rinses should first identify if a known or suspect contaminant requires removal from sampling equipment. Optimum solvents for contaminants are noted above. Secondly, it should be identified whether the subsequent analytical protocol would be impacted by an impurity of, or the solvent being used (e.g., residual acetone present in isopropyl alcohol would be measured with certain volatile organics analysis).
[2] MW CMPDS = molecular weight compounds
[3] Organic bases include Amines, Hydrazines.
[4] Organic acids include Phenols, Thiols, Nitro and Sulfonic compounds.

containers be suitable for the eventual disposition of the materials, and therefore comply with any potentially applicable U.S. Department of Transportation regulations.

c. Sample contaminant sources and other potential problems.

(1) Carryover and leaching. Contaminant carryover between samples, and/or from leaching of the sampling devices, is very complex and requires special attention. Decisions concerning the appropriateness of the device's material composition must account for these carryover or leaching potentials, and whether these contaminants are of concern on the project. Materials potentially encountered on projects and their associated common contaminants are listed in Table E-2.

Equipment blanks may be used to assess contamination of this nature, and are discussed in detail in Instruction H-2 in Appendix H.

(2) Adsorption. Contaminant adsorption is another problem which must be considered when deciding on an applicable sampling device or the appropriate composition material. This phenomenon is more critical when sampling an aqueous or gaseous media, due to the capability of lower levels of contaminant detection and the fact that the fluid matrix is more apt to potential contaminant

Appendix F
Sample Documentation and Shipment Instructions

F-1. Documentation

a. Scope and application. This section describes procedures for maintaining sample control through proper sample documentation. When samples are collected for chemical or physical characteristics analysis, documentation such as chain-of-custody and sample analysis request forms, custody seals, and logbooks needs to be completed. The information presented in this section enables maintenance of sample integrity from time of collection through transportation and storage. It is this documentation that will verify that the samples were properly handled.

b. Documentation. The following discussion outlines standard practices and procedures to be used when documenting a sampling episode. All project-specific documentation requirements must be presented in the sampling and analysis plan (SAP). This includes identification of procedures required for field documentation, sample labeling, and the maintenance of chain-of-custody. Applicable requirements are identified in the following paragraphs. In addition, the contractor is required to obtain a tracking number (e.g., Laboratory Information Management System (LIMS) number) from the U.S. Army Corps of Engineers (USACE) technical manager that is used in conjunction with the government quality assurance (QA) sample shipments. The tracking number should be specified in the SAP. Proper completion of the logbook and supporting paperwork with indelible ink is necessary to support potential enforcement actions that may result from the sample analysis. Therefore, maintaining sample integrity through proper documentation is essential.

(1) Field logbooks. Project field logbooks must be bound and should have numbered, water-resistant pages. All pertinent information regarding the site and sampling procedures must be documented in indelible ink. Notations should be made in logbook fashion, noting the time and date of all entries. Information recorded in this logbook should include, but not be limited to, the following:

(a) Name and exact location of site of investigation or interest.

(b) Date and time of arrival and departure.

(c) Affiliation of persons contacted.

(d) Name of person keeping log.

(e) Names of all persons on site.

(f) Purpose of visit.

(g) All available information on site (processes or products, waste generation, nature of spilled material) and the composition and concentration of substance, if known.

(h) Field instrument equipment used and purpose of use (i.e., health & safety screening, sample selection for laboratory analysis), calibration methods used, field results, and quality control (QC) information.

(i) Location of sampling points (including justification) [Note: It is recommended that a sketch of the general surroundings of the sampling area (site) be provided. Sample identification numbers should correspond directly with sample locations].

(j) Identification number, volume, sampling method, and containers (size/type) for each sample collected. Any sample manipulations such as filtration, compositing, and executed preservation techniques should also be documented.

(k) Date and time of sample and data collection and any factors that may affect their quality.

(l) Name of collector.

(m) All sample identification numbers and a description of samples--especially any related QC samples.

(n) Weather conditions on the day of sampling, and any additional pertinent field observations.

(o) Description of the number of shipping coolers packaged (attach associated chain-of-custody forms) and the shipping method employed (note applicable tracking numbers).

(p) Name and address of all receiving laboratories. For sample shipment to the government QA laboratory, note the associated project LIMS number.

(2) Documenting sampling points. The exact locations of sampling points should be documented for purposes of generating an accurate representation of the site conditions using the data generated to date, defining data gaps, and identifying potential future data needs. This is

(4) Sample collection paperwork.

(a) Sample labels. Sample labels are required for properly identifying samples and evidence. The data obtained from samples collected for a sampling or monitoring activity may be used for remedial measures. All samples must be properly labeled with the label affixed to the container prior to transportation to the laboratory. It is also recommended that samples be photographed so that labels are clearly readable for later identification. Information on sample labels should include, but not be limited to, the following:

- Project Code. An assigned contractor, project number, site name.
- Station Number. A unique identifier assigned to a sampling point by the sampling team.
- Sample Identification Number. Each sample, including field control samples, collected for a project should be assigned a unique number. This assigned number incorporates information on the sample type and date (see Section *b*(4)b in Instruction F-1).
- Samplers. Each sampler's name and signature or initials.
- Preservative. Whether a preservative is used and the type of preservative.
- Analysis. The type of analysis requested.
- Date/Time. Identify the date and time the sample was taken.
- Type of Sample. The type of sample should be identified as discrete or composite.

(b) Sample numbering. A sample numbering system should be used to identify each sample collected and submitted for analysis. The purpose of the numbering system is to assist in the tracking of samples and to facilitate retrieval of analytical results. The sample identification numbers for each sampling effort should be used on sample labels, sample tracking matrix forms, chain-of-custody forms, field logbooks, and all other applicable documentation. A listing of all sample identification numbers should be recorded in the field logbook. The sampling numbering system may vary depending upon the number and type of samples that will be collected at the site. An example of a sample numbering system is presented below. Location and sample identification numbers should consist of the following designations to identify the location (AABBB-CC), sample sequence number, date (MMDDYY), and sample interval for soils (00-00):

For Soil and Bedrock:	AABBB-CC/MMDDYY/00-00
For Water:	AABBB-CC/MMDDYY
For QC Samples:	AABBB-CC/MMDDYY

Example: SB001-01/081492/08-10=Soil Boring SB001, Sample Number 1, sampled on August 14, 1992, from a sample interval of 8 to 10 ft.

Duplicate samples should be numbered in sequential order. For example, a duplicate sample collected from the above soil boring example would have a designation as follows:

Example: SB001-02/081492/08-10

Each sample collected must be assigned a unique sample number. Sample numbers should change when the media or location changes. Sample numbers should not change because different analyses are requested. For example, water samples collected at the same location, date, and time for volatile organics, semivolatile organics, and metals analyses would all have the same sample number, although the various sample aliquots would be collected in different containers.

(c) Chain-of-custody. Chain-of-custody procedures provide documentation of the handling of each sample from the time it is collected until it is destroyed. Chain-of-custody procedures are implemented so that a record of sample collection, transfer of samples between personnel, sample shipping, and receipt by the laboratory that will analyze the sample is maintained. Records concerning the cleaning of empty sample containers, container shipment from the laboratory to the site, and security of empty containers at the site should also be maintained. The chain-of-custody (COC) record (Figure F-2) serves as a legal record of possession of the sample. The COC record is initiated with the acquisition of the sample. The COC record remains with the sample at all times and bears the name of the person (field investigator) assuming responsibility for the samples. The field investigator is tasked with ensuring secure and appropriate handling of the bottles and samples. To simplify the COC record and eliminate potential litigation problems, as few people as possible should handle the sample or physical evidence during the investigation. A sample is considered to be under custody if one or more of the following criteria are met:

he/she received the samples on the COC record. This COC record documents transfer of custody of samples from the field investigator to another person, other laboratories, or other organizational units. Samples must be properly packaged for shipment and delivered or shipped to the designated laboratory for analyses. Shipping containers must be secured by using nylon strapping tape and custody seals (Instruction F-2). The custody seals must be placed on the container so that it cannot be opened without breaking the seals. The seal must be signed and dated by the field investigator. When samples are split with a facility, state regulatory agency, or other government agency, the agency representative must sign the COC record, if present. All samples should be accompanied by the COC record. As previously discussed, the U.S. Army Corps of Engineers (USACE) tracking number (e.g., LIMS number) that is used in conjunction with the government QA sample shipment must be written on the QA sample's COC record. The original and one copy of the record will be placed in a plastic bag taped to the inside lid of the secured shipping container. One copy of the record will be retained by the field investigator or project leader. The original record will be transmitted to the field investigator or project leader after samples are accepted by the laboratory. This copy will become a part of the project file. If sent by mail, the package should be registered with return receipt requested. If sent by common carrier, an air bill should be used. Receipts from post offices and air bills should be retained as part of the documentation of the chain of custody. The air bill number or registered mail serial number should be recorded in the remarks section of the COC record.

(e) Sample analysis request. To ensure that proper analysis is performed on the samples, additional paperwork may need to be filled out, as required by the lab performing the analysis. This form identifies samples by number, location, and time collected and allows the collector to indicate the desired analysis. This form should act as a supplement/confirmation to the COC record and lab contacts made prior to the sample event initiation.

(5) EPA CLP variances. In addition to the previously discussed documents, if the site under investigation is an Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) site, the EPA will require the following documents:

(a) Field sheets. Field sheets are forms provided by the EPA that correspond to samples that are anticipated to be collected at the site. Figure F-4 is an example of an EPA field sheet. When working on an EPA activity, the field sheet will replace the sample analysis request form. The field sheet contains information specific to that job site and sample, including, but not limited to the following:

- Activity number.
- Project number.
- EPA sample number.
- Analyses requested.
- Sample container.
- Preservatives.
- Sampler.
- Date and time.
- Sampler's signature.

(b) Sample identification tags. Sample identification tags are distributed as needed to field workers by the field sampling leader. Procedures for sample identification tags vary among EPA regions. Generally, the EPA serial numbers are recorded in the project files, the field logbook, and the document control officer's serialized document logbook. Individuals are accountable for each tag assigned to them. A tag is considered to be in an individual's possession until it has been filled out, attached to a sample, and transferred to another individual along with the corresponding COC record. Sample identification tags are not discarded. If tags are lost, voided, or damaged, the facts are noted in the appropriate field logbook, and the field team leader is notified. Figure F-5 is an example of a typical sample identification tag. Upon the completion of the field activities, unused sample identification tags are returned to the document control officer, who checks them against the list of assigned serial numbers. Tags attached to samples that are split with the owner, operator, agent-in-charge, or a government agency are accounted for by recording the serialized tag numbers on the receipt-for-samples form. Alternatively, the split samples are not tagged but are accounted for on a COC record. Samples are transferred from the sample location to a laboratory or another location for analysis. Before transfer, however, a sample is often separated into fractions, depending on the analysis to be performed. Each portion is preserved in accordance with prescribed procedures and is identified with a separate sample identification tag, which should indicate in the "Remarks" section

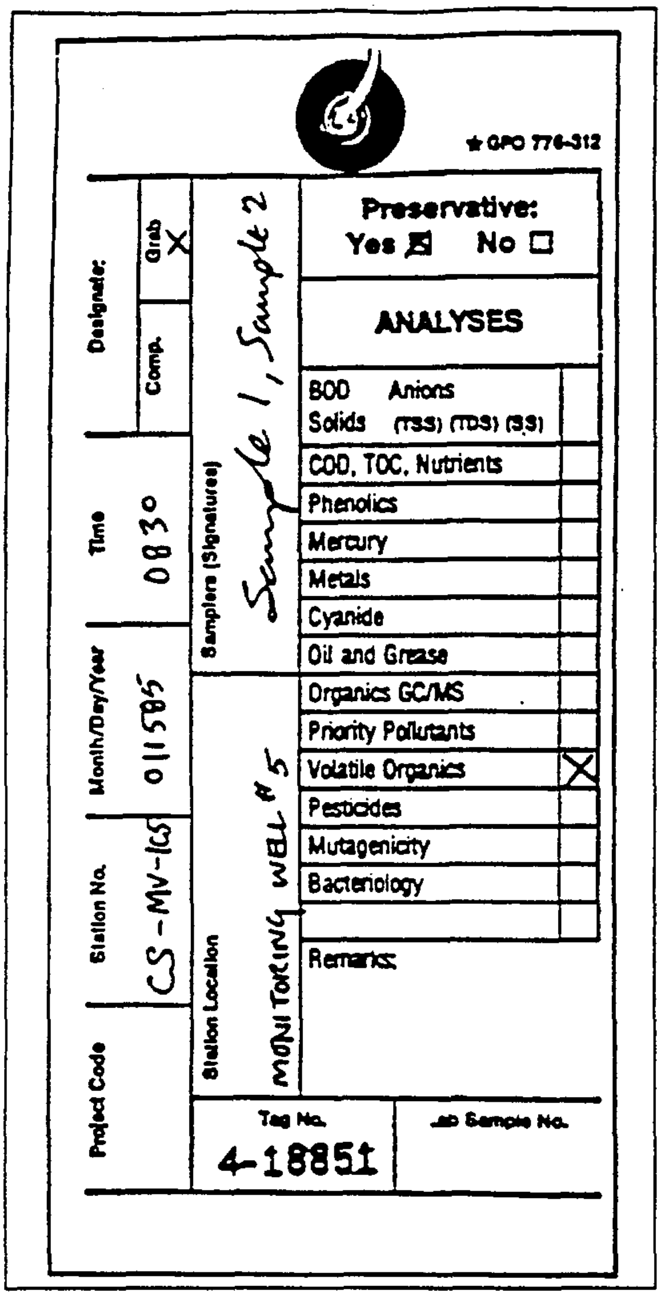


Figure F-5. EPA sample identification tag

numbers of sample containers and volumes beside the analytical parameter(s) requested for particular sample portions. The TR should be placed in the cooler with the COC record and sent to the laboratory.

(d) Receipt-for-samples form. Section 3007(a)(2) of the Resource Conservation and Recovery Act states "If the officer, employee, or representative obtains any samples, prior to leaving the premises, he shall give to the owner, operator, or agent-in-charge, a receipt describing the samples obtained and, if requested, a portion of each such sample equal in volume or weight to the portion retained." Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act (SARA), contains identical requirements. Completing a receipt-for-samples form complies with these requirements; such forms should be used whenever splits are offered or provided to the site owner, operator, or agent-in-charge. Figure F-7 is an example of a typical receipt-for-samples form. This form is completed, and a copy given to the owner, operator, or agent-in-charge even if the offer for split samples is declined. The original is given to the field leader and is retained in the project files. In addition, the contractor must provide analytical results from the samples collected to the owner, operator, or agent in charge, as mandated in SARA.

c. QA/QC requirements.

(1) Corrections to documentation. All original data recorded in field logbooks and on sample labels, chain-of-custody records, and receipt-for-samples forms are written in waterproof ink. If an error is made on an accountable document, corrections should be made simply by crossing out the error and entering the correct information. The erroneous information should not be obliterated. Any error discovered on a document should be corrected by the person who made the entry. All corrections must be initialed and dated.

(2) Photographs. The photographer should review the photographs or slides when they return from developing and compare them with the photographic log to confirm that the log and photographs match.

d. Potential problems. Although most sample labels are made with water-resistant paper and are filled out using waterproof ink, inclement weather and general field conditions can affect the legibility of sample labels. It is recommended that after sample labels are filled out and affixed to the sample container, the label should be covered with wide clear tape. This will preserve the label and keep it from becoming illegible. In addition to label protection, chain-of-custody and analysis request forms should be protected when samples are shipped in iced coolers. Typically, these forms should be placed inside a ziplock bag or similar waterproof protection and taped to the inside lid of the secured shipping container with the samples.

United States
Environmental Protection Agency
Region 10

RECEIPT FOR SAMPLES

Environmental Services Division
U.S. Environmental Protection Agency Region 10
1200 Sixth Avenue, Seattle, Washington 98101

PROJECT NO.	PROJECT NAME	Name of Facility
SAMPLER(S): *(Signature)*		
		Facility Location
Split Samples Offered ( ) Accepted ( ) Declined		

Station Number	Date	Time	Comp.	Grab	Split Samples	Tag Numbers	Sample Description	No. of Containers	Remarks

Transferred by: *(Signature)*		Received by: *(Signature)*		Telephone Number
Date	Time	Title	Date	Time

Distribution: Original to Coordinator Field Files; Copy to Facility

№ 131

Figure F-7. Receipt for samples form

F-2. Packaging and Shipping Procedures

a. Scope and application. This section describes procedures for properly packaging and shipping environmental and hazardous waste samples. The procedures described in this section are performed after samples have been collected and placed in the proper containers and correctly preserved. Guidelines for proper container and preservative selection can be found in Appendix I.

b. Procedures. The following are procedures for packaging and shipping requirements of environmental and hazardous waste samples.

(1) Environmental samples. Environmental samples are defined as those samples collected from environmental matrices such as soil, groundwater, or sediments. Contaminant levels in these types of samples are normally less than 10 ppm. Environmental samples should be packaged for shipment as follows:

(a) Sample container is adequately identified with sample labels (Section b(4)(a) in Instruction F-1). Sample labels are placed on samples at this time if required.

(b) All bottles, except the volatile organic analysis (VOA) vials, are taped shut with electrical tape (or other tape as appropriate). Evidence tape or custody seals (Figure F-8) may be used for additional sample security.

(c) Each sample bottle is placed in a separate plastic bag, which is then sealed. For water samples, each VOA vial is wrapped in a paper towel, and the two vials are placed in one bag. If a trip blank is submitted, it should be wrapped and placed in the bag with the two VOA

(d) Each bottle is placed upright in a separate paint can, the paint can is filled with vermiculite, and the lid is fixed to the can. The lid must be sealed with metal clips or with filament or evidence tape; if clips are used, the manufacturer typically recommends six clips.

(e) Arrows are placed on the can to indicate which end is up.

(f) The outside of each can must contain the proper Department of Transportation (DOT) shipping name and identification number for the sample. The information may be placed on stickers or printed legibly. A liquid sample of an uncertain nature is shipped as a flammable liquid with the shipping name "FLAMMABLE LIQUID, N.O.S." and the identification number "UN1993." A solid sample of uncertain nature is shipped as a flammable solid with the shipping name "FLAMMABLE SOLID, N.O.S." and the identification number "UN1325." If the nature of the sample is known, 40 CFR 171-177 is consulted to determine the proper labeling and packaging requirements.

(g) The cans are placed upright in a cooler that has had its drain plug taped shut inside and out, and has been lined with a garbage bag. Vermiculite is placed on the bottom. Two sizes of paint cans are used: half-gallon and gallon. The half-gallon paint cans can be stored on top of each other; however, the gallon cans are too tall to stack.

(h) All hazardous samples should be shipped to the laboratory on ice and chilled to 4 °C, except for the following samples which do not require shipment with ice:

- Medium concentration water and liquid matrix samples for metals analysis.
- Medium concentration soil and sediment matrix samples for B/N/A, PCBs, and pesticide analyses.

However, because prior knowledge of the analyte concentrations is required to apply this exception, it may be prudent to maintain the cooling requirement.

(i) Additional inert packing material is placed in the cooler to partially cover the sample bottles. If samples are required to be shipped to the laboratory with ice, bags of ice must be placed around the cans. The cooler must be filled with packing material and the liner taped shut.

(j) The paperwork going to the laboratory is placed inside a plastic bag and taped to the inside of the cooler lid. A copy of the COC form should be included in the paperwork sent to the laboratory. The sampler keeps one copy of the COC form. The laboratory should be notified if a parallel sample is being sent to another laboratory for dioxin analysis, or if the sample is suspected of containing any substance for which laboratory personnel should take safety precautions.

(k) The cooler is closed and sealed with strapping tape. At least two custody seals are placed on the outside of the cooler (one on the front and one on the back). More custody seals may be used at the discretion of the sampler.

(l) The following markings are placed on the top of the cooler:

- Proper shipping name (49 CFR 172.301).
- DOT identification number (49 CFR 172.301).
- Shipper's or consignee's name and address (49 CFR-172.306).
- "This End Up" legibly written if shipment contains liquid hazardous materials (49 CFR 172.312).

(m) The following labels are required on top of the cooler (49 CFR 172.406(e)):

- Appropriate hazard class label (placed next to the proper shipping name).
- "Cargo Aircraft Only" (if applicable as identified in 49 CFR 172.101).

(n) An arrow symbol(s) indicating "This Way Up" should be placed on the cooler in addition to the markings and labels described above.

(o) Restricted-article air bills are used for shipment. The "Shipper Certification for Restricted Articles" section is filled out as follows for flammable solid or a flammable liquid:

- Number of packages or number of coolers.
- Proper shipping name: if unknown, use
  - Flammable solid, N.O.S., or
  - Flammable liquid, N.O.S.

Selected Tables from the QAPP and the FSP

List of Tables

QAPP

FSP

Table 4-1 Container Requirements for Soil Samples for the Maywood Investigations

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time[a]
Volatile Organic Compounds	4 – EnCore Samplers	5 g	Cool, 4°C	48 hrs (extraction) 14 d (analysis)
Semivolatile Organic Compounds	1 - 8 oz glass jar with Teflon®-lined cap	90 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
Pesticides/PCBs	Use same container as SVOCs	90 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
Metals	1 - 4 oz wide mouth plastic or glass jar	20 g	Cool, 4°C	180 d, Hg at 28 d
Leachable Anions	Use same container as metals	10 g	Cool, 4°C	28 d
Radiochemical Parameters	1 - 16 oz wide mouth glass jar with Teflon®-lined cap	500 g	None	180 d
Geotechnical Parameters	Shelby tube	NA	None	None
Waste Characteristics	1 - 16 oz wide mouth glass jar with Teflon®-lined cap	1000 g	Cool, 4°C	general 14 d

a : Holding times for extractions, and for analyses (for methods without an extraction holding time requirement) are calculated from the time of sample of sample collection. Holding times for analyses, for methods involving an extraction step, are calculated from the time of extraction to the time of analysis.

Table 4-2 Container Requirements for Water Samples for the Maywood Investigations

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
Volatile Organic Compounds	2 - 40 ml glass vials with Teflon®-lined septum (no headspace)	40 ml	HCL to pH <2 Cool, 4°C	14 d
Semivolatile Organic Compounds	2 - 1L amber glass bottle with Teflon®-lined lid[1]	1000 ml	Cool, 4°C	7 d (extraction) 40 d (analysis)
Pesticides/PCBs and Herbicides	3 - 1L amber glass bottle with Teflon®-lined lid[1]	1000 ml	Cool, 4°C	7 d (extraction) 40 d (analysis)
Metals	1 - L polybottle	500 ml, metals 200 ml, Hg	HNO_3 to pH <2 Cool, 4°C	180 d, metals 28 d, Hg
Nitrate- Nitrite, Ammonia, Phosphate	500 ml polybottle	100 ml each	H_2SO_4 to pH <2 Cool, 4°C	28 d
TOC	125 ml polybottle	50 ml	H_2SO_4 to pH <2 Cool, 4°C	28 d
Sulfide	500 ml polybottle	200 ml	zinc acetate plus NaOH to pH >9 Cool, 4°C	7 d
Cyanide	1 - L polybottle	500 ml	NaOH to pH >10 Cool, 4°C	14 d
TRPH	1 - L glass bottle	1000 ml	H_2SO_4 to pH <2 Cool, 4°C	28 d
Alkalinity/TDS/TSS	1 - L polybottle	100 ml ea.	Cool, 4°C	7 d
Radiochemical Parameters	2 - 1 gal plastic containers[1]	4 L	HNO_3 to pH <2	180 d

[1] One investigative water sample in twenty will require an additional volume for the laboratory to perform appropriate laboratory QC analysis. (i.e., MS/MSD).

Table 4-3 Field Instrument Uses, Detection Limits, and Calibration

Instrument	Uses	Detection limits	Calibration	Comments
Total organic vapor meters	Sample screening for VOCs	PID - 0.2 ppm benzene or	1 point - PID benzene daily	Action level must be stated in Health and Safety Plan
	Health and safety screening	FID - 1.0 ppm methane	1 point - FID methane daily	Instrument cannot differentiate naturally occurring compounds from contaminants
			Verification check every 20 samples	PID cannot detect compounds with ionization potentials > 11 eV
Radiological monitoring	Monitoring of beta-gamma surface, gross gamma, alpha surface contamination levels	Daily calibration check varies by equipment	Daily source check per manufacturer	Validation labels include minimum and maximum acceptable levels
pH meters	Field screening of waters	N/A	2 point with standards at pH 7.0 and 4.0 or pH 7.0 and 10.0 daily	Accuracy is to ± 0.5 pH units
Temperature (in-line)	Determining water temperature	N/A	To manufacturer instructions	
Conductivity meter	Determining conductivity of water	N/A	1 point in KCL solution	Calculations and acceptance criteria must be available in the field
Membrane electrode meter	Determining dissolved oxygen levels	N/A	1 point using calculated value for water at ATP at least once every 3 hours	Accuracy is ± 0.01 ppm
ISOCS Gamma Spectroscopy System	Accurate analysis of a variety of activity distributions in soil	N/A	TBA	TBA

PID = photoionization detector
FID = flame ionization detector
N/A = not applicable
TBA = to be added

Table 6-1 Summary of Analytical Hard-copy Data Deliverables

Method requirements	Deliverables
Requirements for all methods:	
- Holding time information and methods requested	Signed chain-of-custody forms
- Discussion of laboratory analysis, including any laboratory problems	Case narratives
Organics: GC/MS analysis	
- Sample results, including TICs	CLP Form 1 or equivalent
- Surrogate recoveries	CLP Form 2 or equivalent
- Matrix spike/spike duplicate data	CLP Form 3 or equivalent
- Method blank data	CLP Form 4 or equivalent
- GC/MS tune	CLP Form 5 or equivalent
- GC/MS initial calibration data	CLP Form 6 or equivalent
- GC/MS continuing calibration data	CLP Form 7 or equivalent
- GC/MS internal standard area data	CLP Form 8 or equivalent
Organics: GC analysis	
- Sample results	CLP Form 1 or equivalent
- Surrogate recoveries	CLP Form 2 or equivalent
- Matrix spike/spike duplicate data	CLP Form 3 or equivalent
- Method blank data	CLP Form 4 or equivalent
- Initial calibration data	CLP Form 6 or equivalent
- If calibration factors are used	A form listing each analyte, the concentration of each standard, the relative calibration factor, the mean calibration factor, and %RSD
- Calibration curve if used	Calibration curve and correlation coefficient
- Continuing calibration data	CLP Form 9 or equivalent
- Positive identification (second column confirmation)	CLP Form 10 or equivalent
Metals	
- Sample results	CLP Form 1 or equivalent
- Initial and continuing calibration	CLP Form 2 or equivalent, dates of analyses and calibration curve, and the correlation coefficient factor
- Method blank	CLP Form 3 or equivalent and dates of analyses
- ICP interference check sample	CLP Form 4 or equivalent and dates of analyses
- Spike sample recovery	CLP Form 5A or equivalent
- Postdigestion spike sample recovery for ICP metals	CLP Form 5B or equivalent
- Postdigestion spike for GFAA	CLP Form 5B or equivalent
- Duplicates	CLP Form 6 or equivalent
- LCS	CLP Form 7 or equivalent that includes acceptable range or window
- Standard additions (when implemented)	CLP Form 8 or equivalent
- Holding times	CLP Form 13 or equivalent
- Run log	CLP Form 14 or equivalent

Wet Chemistry	
- Sample results	Report result
- Matrix spike recovery	%Recovery
- Matrix spike duplicate or duplicate	%Recovery and %RPD
- Method blank	Report results

Method requirements	Deliverables
- Initial calibration	Calibration curve and correlation coefficient
- Continuing calibration check	Recovery and % difference
- LCS	LCS result and control criteria
- Run log	Copy of run log
Radiochemical Analysis	
- Sample results	Report results
- Initial calibration	Efficiency determination
- Efficiency check	%Difference from calibration
- Background determinations	Report results
- Spike recovery results	Report results
- Internal standard results (tracers or carriers)	Report results
- Duplicate results	Spike added and %Recovery
- Self-absorption factor (α,β)	Standard added and %Recovery
- Cross-talk factor (α,β)	Report results and %RPD
- LCS	Report factors
- Run log	Report factors and control criteria
	LCS results and control criteria
	Copy of run log

CLP – contract laboratory program
GC – gas chromatography
GFAA – graphite furnace atomic absorption
ICP – inductively coupled plasma
LCS – laboratory control sample
MS – mass spectrometry
RPD – relative percent difference
RSD – relative standard deviation
TIC – tentatively identified compound

Table 6-2 Standard Electronic Data Deliverables

Column Position	Length	Field Description
Header Record		
1-20	20	Stone & Webster Project Number
21-28	8	Data Submission Date (MM/DD/YY)
29-33	6	Number of Records (Rows) in the file including header and terminating records
34-74	40	Submitting Laboratory Name
Detail Record		
1-20	20	Stone & Webster Sample Identification Number
21-28	8	Date of Sample Collection (MM/DD/YY)
29-33	5	Time of Sample Collection (HH:MM military format)
34-48	15	Laboratory Analytical Batch/Sample Delivery Group (SDG) Number
49-56	8	Sample Matrix
57-76	20	Laboratory Sample Identification Number
77-84	8	Sample Extraction/Preparation Date (MM/DD/YY)
85-92	8	Sample Analysis Date (MM/DD/YY)
93-97	5	Sample Analysis Time (HH:MM military format)
98-100	3	Analysis/Result Type - This field is used to designate the type of analysis performed. Valid values are as follows: REG = Regular Sample Analysis DUP = Laboratory Duplicate Analysis DIL = Secondary Dilution Analysis REN = Re-analysis where "n" is a sequential number
101-112	12	Chemical Abstract Services (CAS) Number
113-142	30	Analysis Name
143-157	15	Analysis Method (Method numbers shall be the EPA, SW-846, NIOSH, etc. method number)
158-167	10	Result (Report detection limit if not detected)
168-172	5	Result Qualifier (U, J, etc.)
173-180	8	Unit of measure
181-190	10	Instrument Detection Limit
191-195	5	Percent Solids (Report "0" for water matrices)
196-200	5	Sample Weight/Volume
201-202	2	Sample Weight/Volume Units
203-207	5	Dilution
Termination Record		
1-3	3	$$$

Electronic deliverables must have file structure defined in this table. The deliverable file may be either an ASCII text file, a dBASE compatible file (.DBF file extension), or an Excel spread sheet file (.XLS file extension). All fields must be presented. Fields that are not applicable for the reported method shall be reported as blank.

Table 3-1 Sample ID System for all Maywood Sites

XXXX-AAAmmNNNNn-##### – to be used for data base reporting

XXXX##### – to be used for sample collection and delivery to lab

<u>XXXX = Site Designator</u>

Cluster No.	Property Address
1	72 Sidney Street (a.k.a. 88 Money Street)
2a	100 Hancock Street
2b	80 Hancock Street
2c	80 Industrial Road
2d	8 Mill Street (NJVIS)
3	170 Gregg Street (Bergen Cable)
4a	160/174 Essex Street (Bank of New York)
4b	I-80 Westbound ROW
5a	NJ Rt. 17 South & Essex Street (Muscarelle)
5b	113 Essex Street (Bank of New York)
5c	200 NJ Rt. 17 South (Sears Small Truck Repair)
6a	85-101 NJ Rt. 17 North (Hunter Douglas, SWS Realty)
6b	137 NJ Rt. 17 North (AMP Realty)
6c	167 NJ Rt. 17 North (Sunoco Station)
6d	239 NJ Rt. 17 North (Gulf Station)
6e	29 NJ Rt. 17 North (FedEx)
7a	111 Essex Street (Scanel)
7b	Hackensack & Lodi Railroad
8	23 West Howcroft Road (DeSaussure)
9	149-151 Maywood Avenue (Sears Distribution)
10	100 West Hunter (Stephan Company)
11a	205 Maywood Avenue (Myron Manufacturing)
11b	61 West Hunter Avenue (Myron Manufacturing)
11c	50 West Hunter Avenue (Myron Manufacturing)
12a	NY, Susquehanna & Western Railroad
12b	100 West Hunter Avenue (MISS)
12c	NJ Rt. 17

<u>AAA = Area/Activity Designator</u>

Pilot Test = PT1
Burial Pit 1 = BP1
Background = BKG
Push-Pipe = PP
Downhole Gamma = DG
Surface ISOCS = SI

Downhole ISOCS = DI
Drum = DR
Rinsate = RIN
etc. (others as needed)

NNNN = Station Number
Unique station identifier

mm = Media
Surface Soil = SS
Subsurface Soil Boring = SB
Sediment = SD
Ground Water = GW
Surface Water = SW
Storm Water = ST
Aquatic Biota = AB
Terrestrial Biota = TB
Air Filter = AF
Radon Detector = RD
TLDs = TD
Quality Control = QC
Smears (wipes) = SM
Building Materials - BM
etc. (as new media types are identified)

n = Sample Type

Regular = 0	Trip Blank = 3
Duplicate = 1	Equipment Rinsate = 4
Split = 2	Site Source Water Blank = 5

= Sequential Sample Number
Unique to each site