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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for Maywood, New Jersey

U.S. Department of Energy

0489-0613.1

110601

Bechtel

Oak Ridge Corporate Center
151 Lafayette Drive
P.O. Box 350
Oak Ridge, Tennessee 37831-0350

Facsimile: (615) 220-2100

Job No. 14501, FUSRAP Project
DOE Contract No. DE-AC05-91OR21949
Code: 7310/WBS: 138

NOV 15 1993

U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, TN 37831-8723

Attention: Susan M. Cange, Site Manager
Former Sites Restoration Division

Subject: FUSRAP - Maywood Site - Transmittal of WP-IP Ancillary Documents

Dear Ms. Cange:

Enclosed for your use are publication copies of the ancillary documents for the Maywood work plan-implementation plan. Included are two field sampling plans, a quality assurance project plan, a health and safety plan, and a community relations plan. All comments received from reviewers have been incorporated into these documents.

Copies of each of these documents will be placed in the administrative record for the Maywood site.

Sincerely,

M. E. Redmon

M. E. Redmon
Project Manager - FUSRAP

MER:ebs:1346
Enclosure: As stated

ACTION REQ'D	[ ] YES	[X] NO	DUE DATE ______	
RESPONSE TO CHRON NO. ______				

☐ FFA ☐ Permit ☐ Milestone ☐ OcR ☐ CCN ☐ CAR ☐ Mid-Yr ☐ Yr-End ☐ Periodic Rpt

DOE/OR/21949-193.4

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-AC05-91OR21949

Health and Safety Plan for the Remedial Investigation/ Feasibility Study-Environmental Impact Statement for the Maywood Site

Maywood, New Jersey

November 1993

4.53 4503.1

DOE/OR/21949-193.4
138-HSP, Rev. 1
10/22/93

HEALTH AND SAFETY PLAN FOR THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY-ENVIRONMENTAL IMPACT STATEMENT FOR THE MAYWOOD SITE

MAYWOOD, NEW JERSEY

NOVEMBER 1993

Prepared for

United States Department of Energy

Oak Ridge Operations Office

Under Contract No. DE-AC05-91OR21949

By

Bechtel National, Inc.

Oak Ridge, Tennessee

Bechtel Job No. 14501

FOREWORD

This document has been prepared to document the scoping and planning process performed by the U.S. Department of Energy (DOE) to support remedial action activities at the Maywood site, located in northern New Jersey in the boroughs of Maywood and Lodi and the township of Rochelle Park. Remedial action at the Maywood site is being planned as part of DOE's Formerly Utilized Sites Remedial Action Program (FUSRAP).

Under the Comprehensive Environmental Response, Compensation, and Liability Act, a remedial investigation/feasibility study (RI/FS) must be prepared to support the decision-making process for evaluating remedial action alternatives. Consistent with U.S. Environmental Protection Agency guidance for conducting an RI/FS, the work plan (1) contains a summary of information currently known about the Maywood site, (2) presents a conceptual site model that identifies potential routes of human exposure to site contaminants, (3) identifies data gaps, and (4) summarizes the process and proposed studies that will be used to fill the data gaps. Other plans are developed to direct field investigations to resolve the data gaps identified in the work plan. The other plans are the field sampling plan, the quality assurance project plan, and the community relations plan.

The intent of this health and safety plan is to provide the site-specific information required to implement an effective health and safety program at the Maywood site. This will enable site-specific information to be readily available to site employees, increasing the effectiveness of the health and safety program at the site. This document will be used in conjunction with the generic health and safety plan for FUSRAP, which provides the practical framework for health and safety in project operations at all FUSRAP sites.

The work described in this plan was performed between 1989 and 1991; the plan accurately represents the work that was performed. Authorization was given by DOE to proceed with the work using draft documents due to the lengthy review cycle that was necessary for approval by all agencies involved and the need to use available funding to perform the work. The review is now complete, and the plan has been approved for final publication.

HEALTH AND SAFETY PLAN FOR THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY-ENVIRONMENTAL IMPACT STATEMENT FOR THE MAYWOOD SITE

Prepared By:	Michael A. Falzone, Health and Safety Coordinator	10/26/93 Date
Reviewed:	Jim Tarpinian, Health Services Manager	10/28/93 Date
Reviewed:	Ben Martin, Safety Services	11/01/93 Date
Approved:	Tom Morris, Environment, Safety, Health, and Waste Management Manager	11/01/93 Date
Concurrence: (Optional)	Dick Harbert, Program Manager	1NOV93 Date

EMERGENCY ASSISTANCE SERVICES

LOCAL EMERGENCY ASSISTANCE SERVICES

(on call 24 hours a day)

POLICE:	
Maywood Police Department	(201) 845-8800
Rochelle Park Police Department	(201) 843-1515
Lodi Police Department	(201) 473-7600
FBI	(201) 469-7986
AMBULANCE:	
Maywood Ambulance Service	(201) 845-8800
Rochelle Park Ambulance Service	(201) 843-1515
FIRE:	
Maywood	(201) 845-8800
Rochelle Park	(201) 843-1515
Lodi	(201) 473-6237
HOSPITAL:	
Hackensack Medical Center	(201) 441-2000
Emergency Room	(201) 441-2300
Radiation Safety Officer (Alak Mokodam)	(201) 996-2209
DOCTOR:	
John M. Totaro, M.D. (Internist) 490 Maywood Avenue Maywood, New Jersey 07607	(201) 845-6448
HEALTH INFORMATIONAL SERVICES:	
Poison Control Center (Cardinal Glennon Hospital)	(314) 772-5200
CHEMTREC	(800) 424-9300
REAC/TS	(615) 576-3098

NOTE: All of the above telephone numbers are answered 24 hours per day.

ADMINISTRATIVE PERSONNEL

GENERAL:

Bechtel National, Inc. Oak Ridge, Tenn.	**(615) 220-2000** (Monday through Friday, 7:30 a.m. EST to 5:15 p.m. EST)
Project executive secretary	**(615) 576-1757** (business hours only)
FUSRAP switchboard	**(615) 576-1699** (business hours only)
FUSRAP answering service	**(615) 576-1699** (weekends, holidays, after hours)

DEPARTMENT OF ENERGY (DOE) CONTACTS:
(to be contacted by the Program Manager ONLY)

Les Price	**(615) 576-0948** (business hours only)
DOE emergency line, Oak Ridge, Tennessee	**(615) 576-1005** (after hours)
DOE emergency line, Knoxville, Tennessee	**(615) 525-7885** (after hours)

BNI SITE PERSONNEL*:

Site Superintendent** Gerald Blust	**(201) 843-7080**
Site Safety and Health Officer**	**(201) 843-7080**

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*FUSRAP site and project office personnel will be assigned a position before site activities are initiated. An updated list of personnel and telephone numbers will be maintained onsite when FUSRAP personnel are present. An updated list will also be maintained by the health and safety supervisor or designee.

**Telephone numbers for the site superintendent and the site safety and health officer will change periodically; however, the site superintendent will carry a portable pager after hours and can be contacted in the event of an emergency. To obtain non-emergency assistance or current telephone numbers for site personnel, contact the health and safety coordinator for New Jersey FUSRAP sites at the Bechtel National, Inc., office in Oak Ridge, Tennessee [(615) 220-2000]

<u>**PROJECT OFFICE PERSONNEL (Oak Ridge):**</u>

Program Manager	**(615) 576-3998**
Dick Harbert	
Deputy Program Managers	
Phil Crotwell	**(615) 576-9467**
Bill Wagner	**(615) 576-1699**
Project Manager	**(615) 576-4718**
Mike Redmon	
Environment, Safety, Health, and Waste Management Manager	**(615) 574-3355**
Tom Morris	
Health and Safety Supervisor	**(615) 574-3520**
Nevin Thomas	
Health and Safety Coordinator	**(615) 574-4032**
Mike Falzone	
Industrial Safety Supervisor	**(615) 574-3985**
Ben Martin	
TMA/Eberline Project Manager	**(615) 576-0338**
Bruce Coomer	

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(continued)

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REVISION CONTROL INDEX

(continued)

REVISION CONTROL INDEX

FIGURES

TABLES

ACRONYMS

AEC	Atomic Energy Commission
BNI	Bechtel National, Inc.
DOE	U.S. Department of Energy
FUSRAP	Formerly Utilized Sites Remedial Action Program
H&S	health and safety
MISS	Maywood Interim Storage Site
NRC	Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
RI/FS-EIS	remedial investigation/feasibility study-environmental impact statement
SSHO	site safety and health officer

1.0 INTRODUCTION

A generic health and safety plan for the Formerly Utilized Sites Remedial Action Program (FUSRAP) were developed to provide the practical framework for health and safety in project operations at all FUSRAP sites (BNI 1989). This document is a site-specific health and safety plan that builds on the information presented in the FUSRAP generic health and safety plan. Both the Maywood and FUSRAP health and safety plans will be available to onsite personnel.

The intent of the Maywood site health and safety plan is to provide the site-specific information required to implement an effective health and safety program during the remedial investigation/feasibility study-environmental impact statement (RI/FS-EIS). This information will be readily available to site employees, thereby increasing the effectiveness of the site health and safety program.

1.1 SITE LOCATION AND DESCRIPTION

The Maywood site encompasses all properties that became contaminated as a result of processing operations conducted by the former Maywood Chemical Works. These properties include the Stepan Company, the U.S. Department of Energy (DOE) Maywood Interim Storage Site (MISS), and numerous residential, commercial, and governmental properties in Maywood, Rochelle Park, and Lodi.

1.1.1 Maywood Interim Storage Site

MISS lies in a highly developed area in the borough of Maywood and township of Rochelle Park in Bergen County, New Jersey. It is located approximately 20 km (12 mi) north-northwest of downtown Manhattan (New York City) and 21 km (13 mi) northeast of

Newark, New Jersey (Figure 1-1). MISS is bounded by New Jersey Route 17 on the west; the New York, Susquehanna, and Western Railroad line on the north; and commercial and industrial areas on the south and east. Residential units are located north of the railroad line and within 275 m (300 yd) to the west along Grove Avenue. Figure 1-2 is an aerial photograph of the site.

MISS is a fenced lot occupying 4.7 ha (11.7 acres) of a 12.1-ha (30-acre) property previously owned by the Stepan Company. DOE assumed ownership of the site in 1985.

MISS currently encompasses a storage pile that covers approximately 4.9 ha (2 acres) and contains 27,000 m^3 (35,000 yd^3) of low-level radioactive waste. There are two structures (Building 76 and the pumphouse) and a reservoir at MISS. Two railroad spurs traverse the site. A decontamination facility is located on the Stepan Company property, adjacent to the storage pile.

1.1.2 Vicinity Properties

Several residential, commercial, and governmental vicinity properties in the boroughs of Maywood and Lodi and the township of Rochelle Park are known to have been radioactively contaminated from operations at the Maywood Chemical Works. These properties, shown in Figure 1-3, were identified by DOE through surveys performed by Oak Ridge National Laboratory. For the purposes of this investigation, the vicinity properties are segmented into residential properties and commercial/governmental properties. In Rochelle Park, these properties include nine residential properties on Grove Avenue and Park Way (eight have been completely decontaminated; a small portion of the ninth has not been decontaminated). Maywood properties include 13 commercial properties, part of the Route 17 embankment, a vacant lot, and approximately 10 residential properties. Eight Maywood properties have been decontaminated. In Lodi, these properties include

50 residential, commercial, and governmental properties on Trudy Drive, Hancock Street, Branca Court, Long Valley Road, Essex Street, Redstone Lane, Columbia Lane, Garibaldi Avenue, Kennedy Drive, Sidney Street, and Avenues B, C, E, and F. Eight Lodi properties have been decontaminated.

1.2 SITE HISTORY

1.2.1 Maywood Interim Storage Site

MISS was established to provide an interim storage site for low-level radioactive waste materials that originated from operations at the former Maywood Chemical Works. From 1916 through 1956, Maywood Chemical Works processed monazite sand to extract thorium and rare earths for use in manufacturing industrial products such as mantles for gas lanterns. During this time, slurry that contained process wastes from thorium operations was pumped to diked areas west of the plant. Some of these process wastes were removed from the site for use as mulch and fill on nearby properties, thereby contaminating those properties with radioactive elements. Some of the material also migrated offsite via natural drainage provided by the former Lodi Brook. In 1932, Route 17 was built across the diked disposal area (Figure 1-4).

In 1954, the Atomic Energy Commission (AEC) issued License R-103 to Maywood Chemical Works, thereby allowing it to continue to possess, manufacture, and distribute radioactive materials. Maywood Chemical Works stopped extracting thorium in 1956 after approximately 40 years of production and was sold to the Stepan Company in 1959.

In 1961, Stepan was issued an AEC radioactive materials license (STC-130). Based on AEC inspections and information related to the property currently owned by the Ballod Associates on the west side of Route 17, Stepan agreed to perform remedial action; cleanup began in 1963. In 1966, 6,400 m^3 (8,400 yd^3) of waste was removed from the area west of Route 17 and buried on the Stepan property at burial site 1, an area now covered by grass. In 1967, approximately 1,600 m^3 (2,100 yd^3) of waste was removed from the same general area and buried on the Stepan property at burial site 2, which is now a parking lot. In 1968, Stepan obtained permission from AEC to transfer an additional 6,600 m^3 (8,600 yd^3) of waste from the south end of the Ballod property and bury it on the Stepan property at burial site 3, where a warehouse was later built. Building 76 was constructed over part of an area that was formerly occupied by thorium processing facilities, which is known to be contaminated with radioactive materials. Figure 1-4 shows the approximate locations of the burial sites and Building 76.

At the request of the Stepan Company, a radiological survey of the south end of the Ballod property west of Route 17 was conducted by AEC in 1968. Based on the findings of that survey, clearance was granted for release of the property for use with no radiological restrictions. At the time of the survey, AEC was not aware of contaminated waste materials still present in the northeast corner of the property. In 1968, the portion of the Stepan property west of Route 17 was sold to a private citizen who later sold it to Ballod Associates.

In 1980, the U.S. Nuclear Regulatory Commission (NRC) was notified that elevated radiological readings were obtained on the Ballod property. This information prompted NRC to request a comprehensive survey to assess the radiological condition of the property. The survey was performed in February 1981 by Oak Ridge Associated Universities with the assistance of a representative from the Region I office of NRC.

NRC also requested that an aerial radiological survey be conducted of the Stepan property, the Ballod property, and the surrounding area. This survey, which was conducted by EG&G Energy Measurements Group in January 1981, resulted in the discovery of other anomalies (radiation readings distinctly higher than those of surrounding areas)

(EG&G 1981). Elevated gamma readings (greater than the local background level) were detected directly over the Stepan chemical plant, as well as immediately to the west and south of the plant. Two other points of elevated background gamma radiation were detected approximately 0.8 km (0.5 mi) from the center of the plant: one to the northwest and the other to the south. Follow-up ground surveys were performed to determine the nature of these anomalies.

The 1984 Energy and Water Development Appropriations Act authorized DOE to conduct a decontamination research and development project at the site of the former Maywood Chemical Works and properties in its vicinity, and the site was assigned to FUSRAP.

In 1984, DOE negotiated with Stepan for access to a 4.7-ha (11.7-acre) portion of the Stepan property on which to establish MISS, pending execution of an agreement to transfer ownership of the site to DOE. In September 1985, ownership of the MISS property was transferred to DOE.

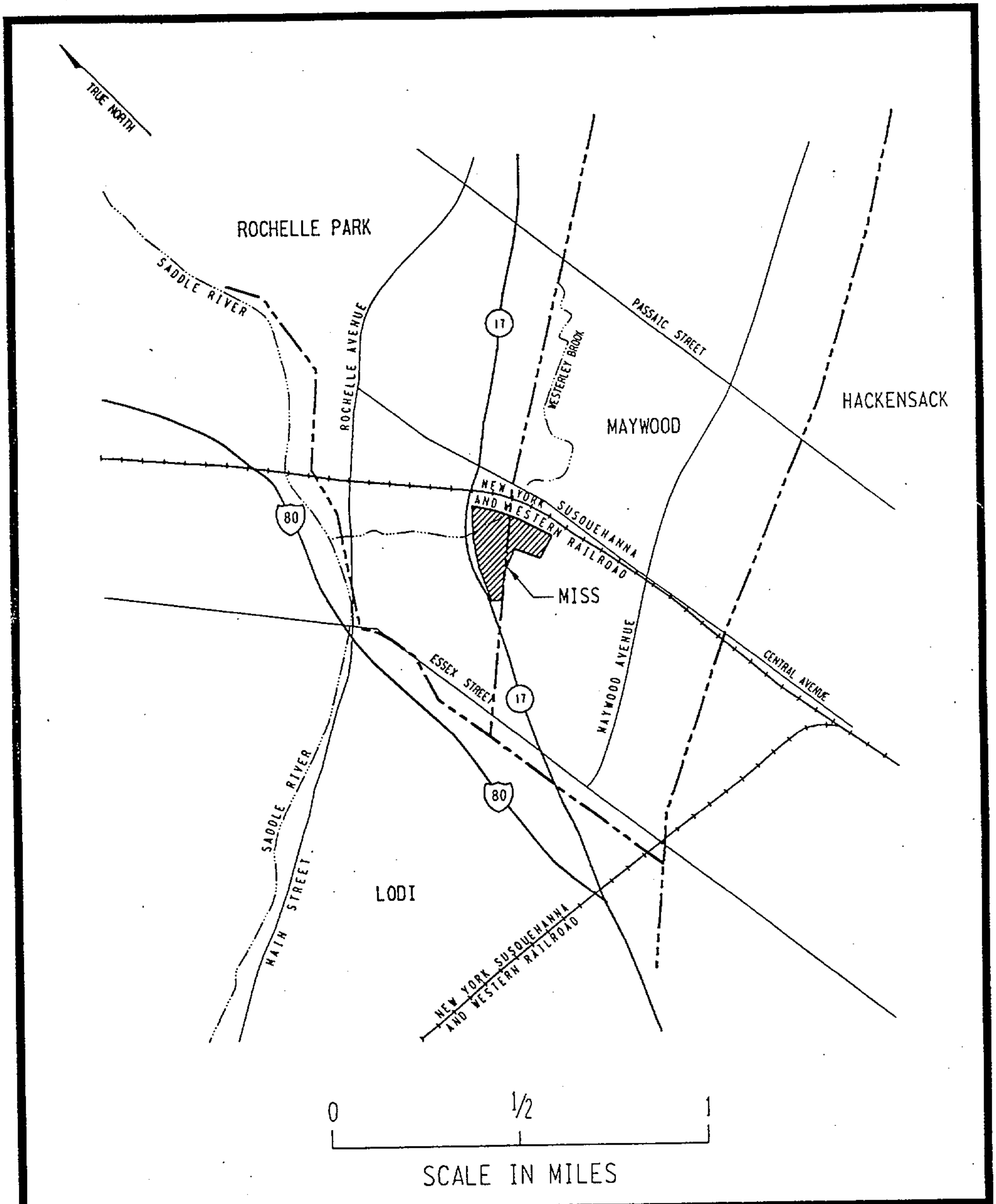
1.2.2 Vicinity Properties

The vicinity properties are those that became contaminated as a result of activities at the former Maywood Chemical Works. The properties surrounding MISS became contaminated in several ways: sediment transport, removal of material for fill, and onsite operations. Table 1-1 lists some of the properties that were identified as contaminated and indicates how they became contaminated.

1.3 PROJECT ORGANIZATION

Project organization, coordination, and responsibilities are based on the project management structure currently in effect for FUSRAP (BNI 1989). Personnel assignments to the organization are reviewed and updated monthly.

The health and safety (H&S) group of the Environmental, Safety, Health and Waste Management Department for FUSRAP is responsible for the development and implementation of all health and safety criteria (BNI 1989). The H&S supervisor or designee will assign individuals to the site health and safety positions at the beginning of the project and at the beginning of major tasks. A written list of personnel assigned to the project will be maintained at the site and by the H&S supervisor or designee.



138F049.DGN

Figure 1-1
Location of MISS

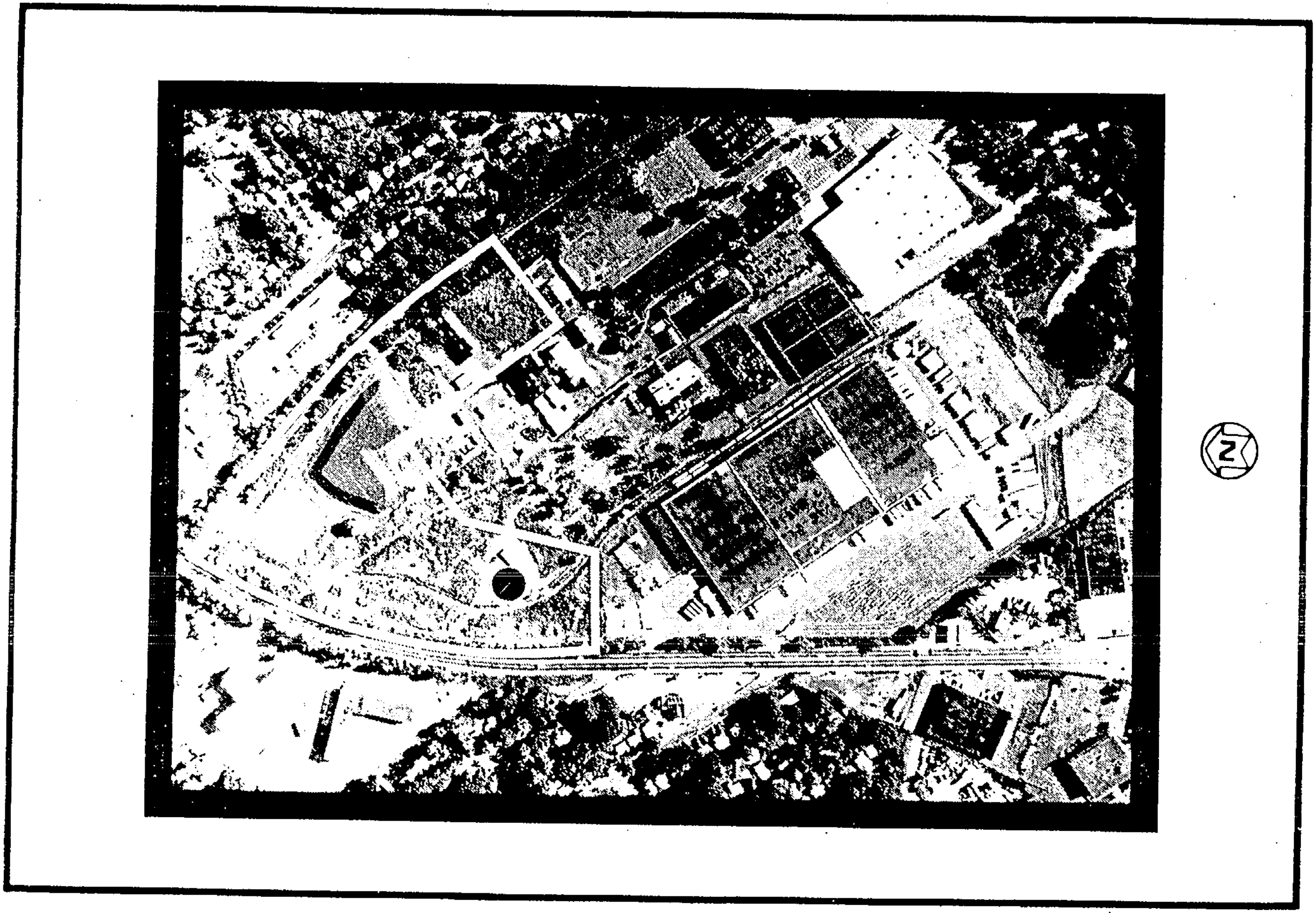


Figure 1-2
Aerial View of MISS and Its Vicinity

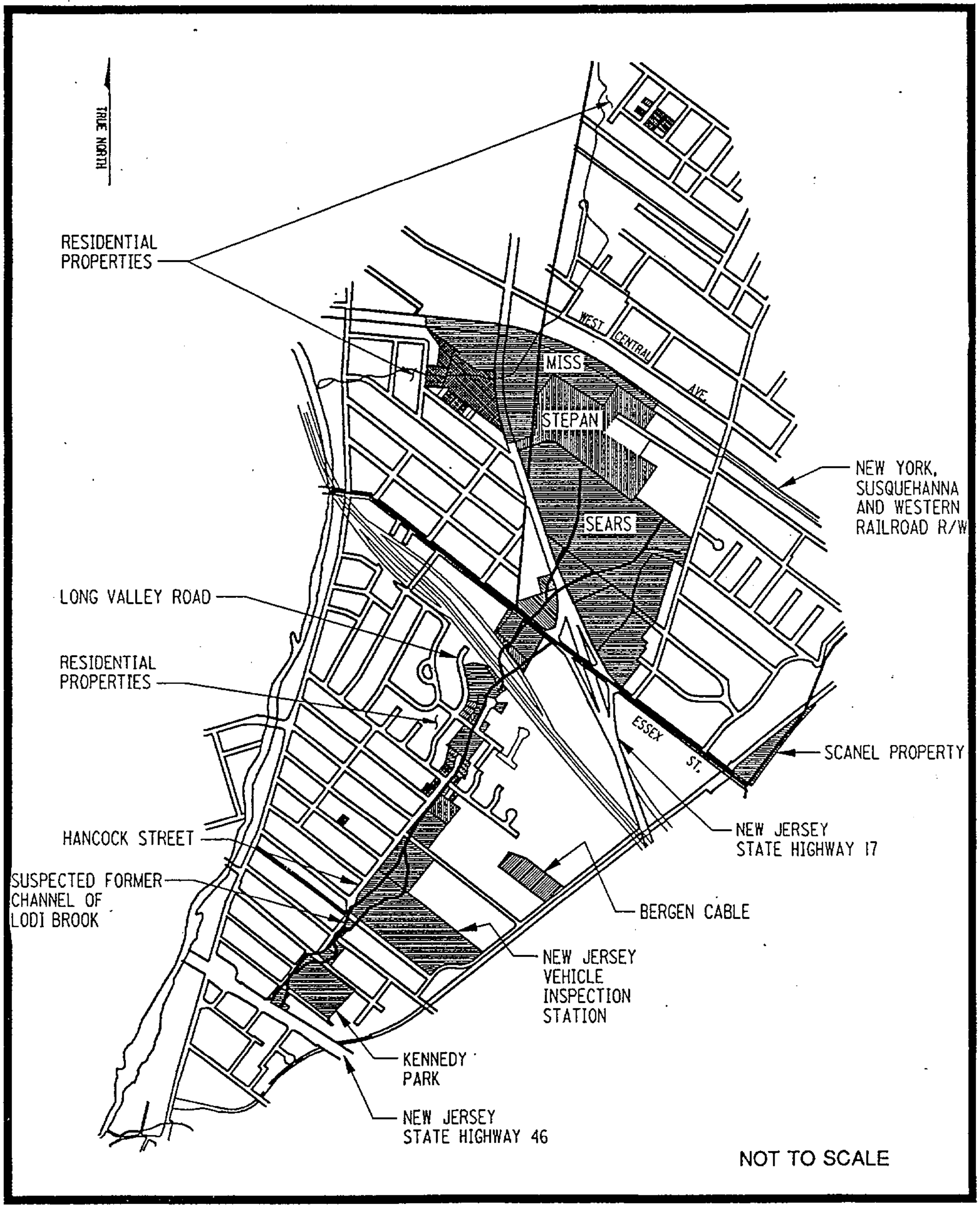


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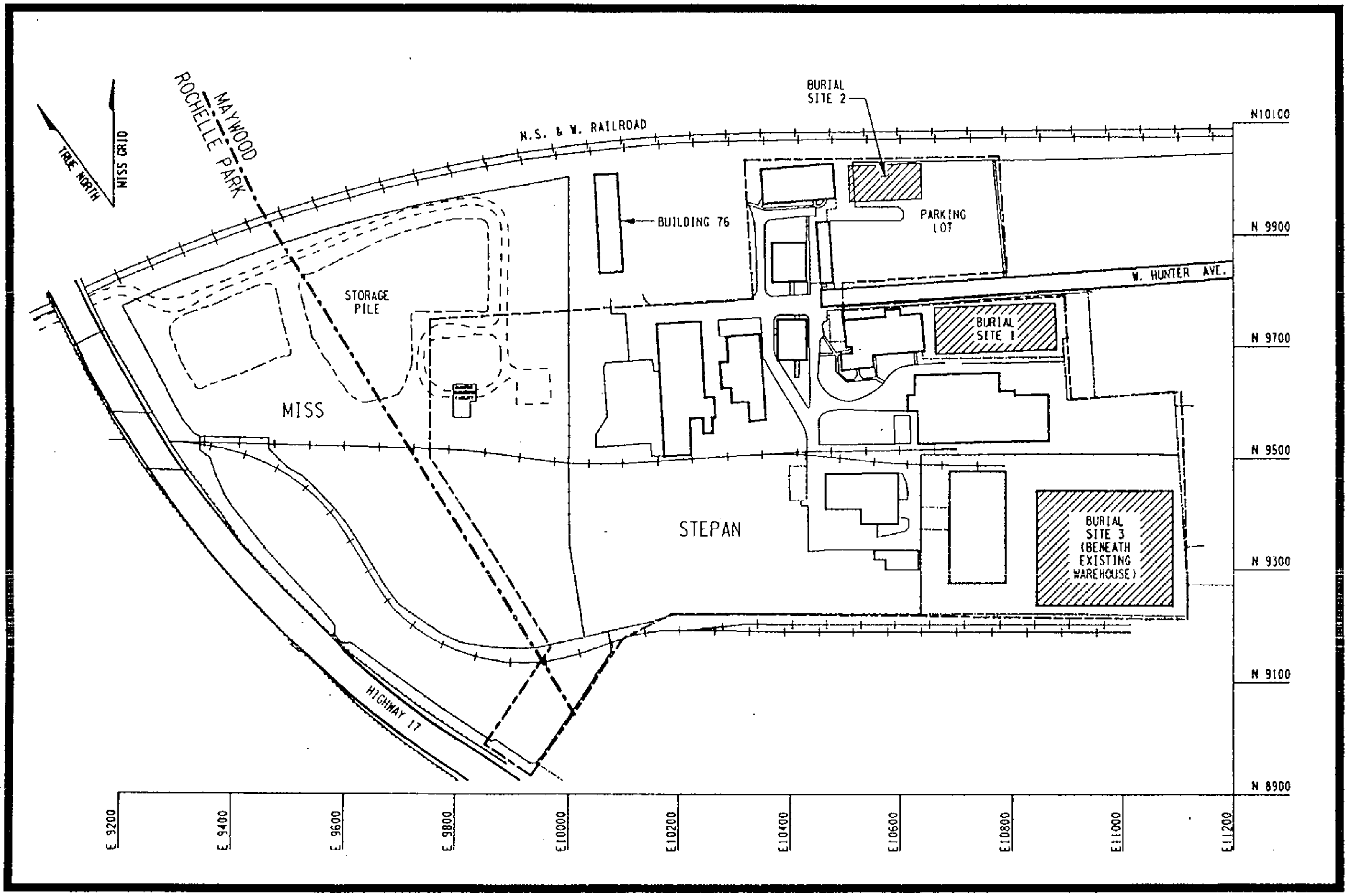
Figure 1-3
Locations of Vicinity Properties



138F048.DGN

Figure 1-4
Burial Site Locations on the Stepan Company Property

Table 1-1

Vicinity Properties Associated with the Maywood Site

Page 1 of 4

Property	Types and Means of Contamination
Sears, Maywood	Fill material/brook sediment
Ballod, Rochelle Park	MCW process waste ponds
Stepan, Maywood	MCW/burial areas
Scanel, Maywood	Fill material
Hunter-Douglas, Maywood	Fill material/brook sediment
Federal Express, Maywood	Fill material/brook sediment
Gulf Station, Maywood	Fill material/brook sediment
DeSaussure, Maywood	Fill material/brook sediment
Sunoco, Maywood	Fill material/brook sediment
New Jersey Vehicle Inspection, Lodi	Fill material/brook sediment
Bergen Cable, Lodi	Fill material/brook sediment
Route 17, Maywood and Rochelle Park	Fill material/brook sediment
New York, Susquehanna, and Western Railroad (western right-of-way), Lodi	Fill material
454 Davison Avenue, Maywood	Fill material
459 Davison Avenue, Maywood	Fill material
460 Davison Avenue, Maywood	Fill material
464 Davison Avenue, Maywood	Fill material
468 Davison Avenue, Maywood	Fill material
459 Latham Street, Maywood	Fill material
461 Latham Street, Maywood	Fill material
467 Latham Street, Maywood	Fill material

Table 1-1

(continued)

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Property	Types and Means of Contamination
10 Grove Avenue, Rochelle Park	Fill material/surface migration
22 Grove Avenue, Rochelle Park	Fill material/surface migration
26 Grove Avenue, Rochelle Park	Fill material/surface migration
30 Grove Avenue, Rochelle Park	Fill material/surface migration
34 Grove Avenue, Rochelle Park	Fill material/surface migration
38 Grove Avenue, Rochelle Park	Fill material/surface migration
42 Grove Avenue, Rochelle Park	Fill material/surface migration
86 Park Way, Rochelle Park	Fill material/surface migration
90 Park Way, Rochelle Park	Fill material/surface migration
59 Avenue C, Lodi	Fill material
58 Trudy Drive, Lodi	Brook sediment
59 Trudy Drive, Lodi	Brook sediment
60 Trudy Drive, Lodi	Brook sediment
61 Trudy Drive, Lodi	Brook sediment
62 Trudy Drive, Lodi	Brook sediment
64 Trudy Drive, Lodi	Brook sediment
121 Avenue F, Lodi	Fill material
123 Avenue F, Lodi	Brook sediment
2 Branca Court, Lodi	Brook sediment
4 Branca Court, Lodi	Brook sediment
6 Branca Court, Lodi	Brook sediment
7 Branca Court, Lodi	Brook sediment

Table 1-1

(continued)

Page 3 of 4

Property	Types and Means of Contamination
11 Branca Court, Lodi	Brook sediment
14 Long Valley Road, Lodi	Brook sediment
16 Long Valley Road, Lodi	Brook sediment
18 Long Valley Road, Lodi	Brook sediment
20 Long Valley Road, Lodi	Brook sediment
22 Long Valley Road, Lodi	Brook sediment
24 Long Valley Road, Lodi	Brook sediment
26 Long Valley Road, Lodi	Brook sediment
11 Redstone Lane, Lodi	Brook sediment
17 Redstone Lane, Lodi	Brook sediment
19 Redstone Lane, Lodi	Brook sediment
Lodi Municipal Park, Lodi	Brook sediment
3 Hancock Street, Lodi	Brook sediment
4 Hancock Street, Lodi	Brook sediment
5 Hancock Street, Lodi	Brook sediment
6 Hancock Street, Lodi	Brook sediment
7 Hancock Street, Lodi	Brook sediment
8 Hancock Street, Lodi	Brook sediment
9 Hancock Street, Lodi	Brook sediment
10 Hancock Street, Lodi	Brook sediment
80 Hancock Street, Lodi	Brook sediment
100 Hancock Street, Lodi	Brook sediment

Table 1-1

(continued)

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Property	Types and Means of Contamination
80 Industrial Road, Lodi	Brook sediment
106 Columbia Lane, Lodi	Brook sediment
99 Garibaldi Avenue, Lodi	Brook sediment
Fire Station No. 2, Lodi	Brook sediment
Fireman's Memorial Park, Lodi	Brook sediment
J. F. Kennedy Municipal Park, Lodi	Brook sediment
72 Sidney Street, Lodi	Brook sediment
79 Avenue B, Lodi	Fill material
90 Avenue C, Lodi	Fill material
108 Avenue E, Lodi	Fill material
112 Avenue E, Lodi	Fill material
113 Avenue E, Lodi	Fill material
136 W. Central Avenue, Maywood	Fill material
113 Essex Street, Maywood	Brook sediment
160 Essex Street, Lodi	Brook sediment
174 Essex Street, Lodi	Brook sediment
Interstate 80 (east and west right-of-way at Lodi exit)	Brook sediment
200 Rt. 17, Maywood	Brook sediment
Rt. 17 and Essex Street, Maywood	Brook sediment

2.0 HAZARD ANALYSIS

Hazardous materials suspected or known to exist at the Maywood site are listed in Table 2-1. Consequences from exposure to these chemicals or radioactive materials may include burns, blood abnormalities, central nervous system damage, kidney damage, liver damage, edema, chemical asphyxiation, cancer, and death. Pathways into the body include inhalation, skin absorption, skin/eye contact, and ingestion. Material safety data sheets and other technical data for each identified chemical will be available onsite and used in training as required by 29 CFR 1910.1200, "Hazard Communication." The degree of risk to personnel from each contaminant depends on the amount of material encountered and the way in which it is contacted.

Engineering and/or administrative controls, along with personal protective equipment, will be used to minimize exposure to radioactive materials and toxic chemicals. RI/FS-EIS plans, remedial action plans, and subcontract specifications will identify engineering controls to be used to minimize exposure to toxic substances whenever practicable. Examples of engineering controls include:

- Using fans to remove contaminants from the breathing zone
- Purging boreholes with nitrogen to eliminate the physical hazard of fire and explosion when drilling boreholes that contain combustible vapors
- Providing shielding to protect personnel from radioactive materials

Administrative controls to keep exposures as low as reasonably achievable often can be accomplished by rotating personnel from the work site. The H&S group will identify other administrative controls and will specify personal protective apparel and equipment to be provided and used when engineering controls cannot reduce contaminants to below permissible limits or when the potential exists for exposure to contamination. Onsite personnel will be required to use modified level D personal protection, which includes Tyvek coveralls, rubber boots, eye protection, and safety hats. The level of protection may be modified based on the results of direct-reading instruments and following the protocol of the FUSRAP health and safety plan (BNI 1989); however, the level of protection will not be downgraded below modified level D protection. A summary of radiological and chemical data collected during characterization activities between 1984 and 1988 is provided in Appendix A. Additional radiological and chemical data are provided in the *Remedial Investigation Report for the Maywood Site* (BNI 1992).

Hazards associated with site activities (e.g., drilling, well monitoring) are identified in the FUSRAP health and safety plan (BNI 1989). Some of the potential hazards associated with these activities are listed in Table 2-2.

2.1 MATERIAL HANDLING

Oil and gas will be used onsite for maintaining equipment; other chemicals (e.g., isopropyl alcohol, nitric acid) will be used for decontaminating equipment. The personal protective equipment (Tyvek and gloves) that will be used during work activities will provide protection during handling of these chemicals. In addition, eye protection and/for face shields will be used during decontamination operations.

2.2 WORKING ON OR NEAR EQUIPMENT

During drilling activities, personnel will be working on and near drill rigs. Only trained and experienced personnel will operate equipment. Drill rig operators are required to check equipment daily and make repairs as necessary. They will use caution while operating equipment and follow safe practices when other personnel are working on or near the drill rigs. The drill rig operator will check for underground utilities before drilling and will not operate the drill rig near overhead power lines. All subcontractors are required to comply with FUSRAP health and safety requirements and procedures.

2.3 CONFINED SPACE ENTRY

Entry into confined spaces is not anticipated during the work at MISS because there are no known confined spaces in the work area. If the need to enter confined spaces arises, the regulations proposed by the Occupational Safety and Health Administration (OSHA) and FUSRAP regulations and project instructions will be followed.

Table 2-1

Suspected or Known Hazardous Materials at the Maywood Site

Page 1 of 2

I. Organics detected in groundwater
- 1,1,1-trichloroethane
- Tetrachloroethene
- 1,2-trans-dichloroethene
- Benzene
- Toluene
- Methylene chloride
- Chloroform
- Bis(2-ethylhexyl)phthalate
- Di-n-octyl phthalate
- 1,1,2,2-tetrachloroethane
- Vinyl chloride
- Acetone
- Carbon disulfide
- 1,1-Dichloroethene
- Xylenes

II. Organics in sludges
- Phenol
- Fluoranthene
- Di-n-butyl phthalate
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Chrysene
- Phenanthrene
- Pyrene

III. Inorganic contaminants
- Antimony
- Arsenic
- Barium
- Boron
- Cadmium
- Chromium
- Cobalt

Table 2-1

(continued)

Page 2 of 2

III. Inorganic contaminants (cont'd)

Copper
Lead
Lithium
Nickel
Selenium
Sulfate
Vanadium
Uranium
Thorium nitrate
Thorium oxide
Thorium phosphate
Lithium hydroxide
Lithium chloride
Cerium
Lanthanum
Neodymium

IV. Radioactive Contaminants

Radium-226
Radon-220
Radon-222
Thorium-232
Uranium-238

V. Corrosive materials

Acidic sludges
Caustic sludges

Vi. Biological contaminants

Plant genus Rhus (e.g., poison ivy, poison oak)
Insects

Table 2-2

Potential Hazards Associated with Maywood Site Activities

Stress from extreme temperatures
Potential exposure to radioactive, chemical, or biological waste
Exposure to excessive noise levels
Safety hazards associated with heavy equipment
Safety hazards associated with underground utilities
Fire
Electrocution
Falling objects

3.0 MEDICAL SURVEILLANCE

All project personnel will be enrolled in the medical program described in the FUSRAP health and safety plan (BNI 1989). Detailed procedures were developed by Bechtel National, Inc. (BNI) in compliance with 29 CFR 1919.120, "Hazardous Waste Operations and Emergency Response."

4.0 BIOASSAY PROGRAM

Routine bioassay samples will be collected from all employees before they start work in restricted areas, at quarterly intervals, upon worker termination, and upon completion of the job. Urine samples will be analyzed for total uranium, thorium-232, and radium-226. Because of the insolubility of some of these radionuclides, detection of inhalation exposures by urinary analysis may not be possible. Therefore, the bioassay program will be supplemented with ambient area and breathing zone air monitoring. Any individual suspected of sustaining an intake of radioactive contaminants will have special samples collected at the direction of the H&S supervisor or designee. These special bioassay samples may include both urine and fecal samples. Exposure to concentrations of radionuclides that exceed limits for workers is not expected during the remedial investigation.

Exposure to significant concentrations of metals is not expected during remedial investigation studies; however, if such exposure does occur, a bioassay analysis will be required. Exposure to benzene could occur during remedial investigation activities. Personnel whose work activities involve potential exposure to benzene may be required by the H&S supervisor or designee to submit urine samples at the end of their work shift.

5.0 MONITORING PROGRAM

5.1 MONITORING RATIONALE

During work activities, direct-reading instruments will be used to monitor personnel and the work area for volatile organic chemicals, combustible gas/oxygen, and radiation. Table 2-1 lists the suspected and known hazardous materials that will be monitored. Monitoring will be supplemented with long-term personal air samples, as necessary.

Monitoring by an organic vapor direct-reading instrument will be continuous at borehole openings and in personnel breathing zones. The level of personal protection will be modified as necessary, based on the results of the direct-reading instruments.

5.2 PERIMETER MONITORING

Results from the direct-reading instruments for the chemical materials listed in Table 2-1 will be used to determine the need for perimeter monitoring. The following monitoring rationale will be followed:

- If a concentration of 5 parts per million of a volatile organic chemical is detected at the perimeter of the exclusion zone, monitoring at the perimeter of the site should begin.

- If the level of combustible gas/oxygen reaches 10 percent of the lower explosive limit at the perimeter of the exclusion zone, site perimeter monitoring should be initiated.

- If two direct readings of zero parts per million are obtained and the combustible gas/oxygen meter reads zero percent, monitoring at the perimeter of the site may be discontinued.

6.0 PERSONAL PROTECTIVE APPAREL AND EQUIPMENT

Personal protective apparel/equipment requirements and practices for protection against airborne contamination, skin absorption, skin contact, or impact hazards are contained in the FUSRAP health and safety plan (BNI 1989).

The specific personal protective apparel/equipment that will be used at the Maywood site includes, but is not limited to:

- Tyvek coveralls [type to be identified by the site safety and health officer (SSHO) depending on the task and potential for exposure]
- Work boots worn with protective rubber overshoes
- Eye protection (e.g., goggles and/or face shields) whenever there is a potential for eye damage from hazards such as flying objects or contact with corrosive or irritating materials
- Safety helmets (hard hats) to be worn by all workers at all times in work areas
- Hearing protection against noise levels exceeding permissible limits
- Respiratory protection as required by the SSHO when airborne contaminants present are known or suspected to exceed the permissible exposure limit

- Chemical-resistant gloves will be used as integral, attached, or separate items from other protective clothing. Disposable gloves should be used whenever possible to reduce decontamination needs. The following types of gloves will be available, the types needed will be determined by the SSHO:

  - Surgical inner liner gloves
  - Cotton inner liner gloves
  - Polyvinyl alcohol gloves
  - Cotton outer gloves
  - Neoprene or rubber gloves

7.0 TRAINING REQUIREMENTS

7.1 GENERAL

Training requirements will follow the criteria established in the following OSHA standards: 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response," and 29 CFR 1910.1200, "Hazard Communications." Details of the training program are given in the FUSRAP health and safety plan (BNI 1989).

7.2 SITE-SPECIFIC TRAINING

Site-specific training at the Maywood site will be conducted before work begins. Subjects such as types and levels of contamination, specific health and safety concerns and associated personal protective equipment, fire extinguisher use, the emergency response plan, site safety procedures, and FUSRAP protocol will be discussed. Arrangements will be made by the SSHO and site superintendent to provide a training location with a minimum of distractions.

8.0 EMERGENCY RESPONSE AND NOTIFICATION

8.1 GENERAL

Emergencies will be responded to in accordance with the emergency response and notification guidelines established for FUSRAP.

The SSHO will ensure that all personnel are familiar with the procedures for communicating with local and project emergency services in the event that someone other than the SSHO or a designated representative is called upon to handle an emergency.

In responding to emergency situations at the work site, personnel will contact emergency services, depending on the nature of the emergency condition (e.g., fire department, doctor, police). Emergency telephone numbers established for the Maywood site are given in the emergency assistance services listed on pages v and vi of this plan. The location of and route to the preferred local hospital are shown in Figure 8-1. This hospital was contacted prior to work start-up and can accept radioactively contaminated patients. Site personnel will transport severely injured persons to the hospital only as a last resort when a professional transport service is not available.

A detailed investigation of emergency conditions and their causes will be conducted jointly by the senior BNI representative onsite and the SSHO. The senior BNI representative will notify the project office in Oak Ridge, Tennessee, as soon as the emergency condition is secure. Notification of an incident will be given in accordance with established FUSRAP emergency response procedures.

8.2 OCCUPATIONAL INJURIES

In compliance with 29 CFR 1926.50, "Medical Services and First-Aid," a person with a valid certificate in first aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, will be available at the work site to render first aid. First aid kits will be kept in the BNI office.

Personnel with injuries that require a physician's attention will be transported by the ambulance service identified in the emergency assistance services listed on pages v and vi of this plan.

If the injured worker has been working in a radioactively contaminated/restricted area, a radiological survey will be conducted when practical. This survey will be conducted by qualified personnel before the ambulance arrives to determine whether contamination is present. If possible, decontamination activities will be conducted before the arrival of emergency medical personnel; however, medical care for the injured worker takes precedence over decontamination. Emergency workers and hospital personnel will be notified of the type and extent of contamination, if present.

Personnel responding to emergency conditions to rescue an accident victim requiring first aid may proceed under the following conditions:

- To administer first aid, at least one person in the rescue party must possess a valid first aid certification card.
- Existing environmental conditions must not threaten the rescuers' lives.

- Equipment used for rescue operations must be intrinsically safe for use in flammable or explosive environments. In addition, rescue workers must have the proper protective equipment and follow proper decontamination procedures to prevent injury to themselves.

- Whenever personal protective equipment is not available (e.g., confined space entry), monitoring equipment will be available and used during rescue operations to sample airborne concentrations of hazardous/toxic environments.

8.3 FIRE EMERGENCY

Trained personnel will attempt to extinguish small fires with portable fire extinguishers. If a fire cannot be extinguished with portable extinguishers, personnel will immediately evacuate the area.

The senior BNI representative or designee will interact with the fire department as it arrives on the scene. The senior BNI representative or designee will provide to the responding fire department representative all pertinent information, including potential hazards, missing personnel and their last known work locations, and fire location and size.

8.4 EVACUATION PLAN

Personnel may be required to evacuate any work location in the event of fire; chemical spill; toxic, flammable, or explosive atmospheres; or other abnormal conditions. The evacuation will continue until normal working conditions have been restored and permission to return to work is granted by authorized personnel. During any evacuation, all personnel should remain calm and follow prescribed procedures for an orderly exit.

Responses to emergencies affecting Stepan Company personnel or facilities will be conducted in cooperation with Stepan Company safety personnel. During an emergency, FUSRAP personnel on Stepan property will follow established plant evacuation procedures.

8.4.1 Evacuation from Outdoor Areas

Evacuation from an outdoor location will be cross-wind from the source to a safe location. Evacuation routes will depend upon the wind direction and location of the emergency. All personnel will meet at a designated location (the main guard house) or as directed by the SSHO or site superintendent. The SSHO and site superintendent will be responsible for evacuation and for determining whether any personnel are missing. The SSHO will determine when it is safe to reenter the site.

8.4.2 Evacuation from Buildings

If an emergency evacuation from Building 76 is necessary, personnel will assemble at a cross-wind location as directed by the SSHO or site superintendent. The SSHO will train BNI and subcontractor personnel and visitors on these procedures.

To respond to an emergency at the adjacent Stepan property, the SSHO and site superintendent will become familiar with Stepan Company emergency procedures and make BNI and subcontractor personnel and visitors aware of the procedures.

8.5 SITE SECURITY

BNI will comply with the security procedures currently in place for FUSRAP, MISS, and the Stepan Company.

8.6 EMERGENCY ASSISTANCE SERVICES

Refer to pages v and vi of this health and safety plan for the list of emergency assistance services.

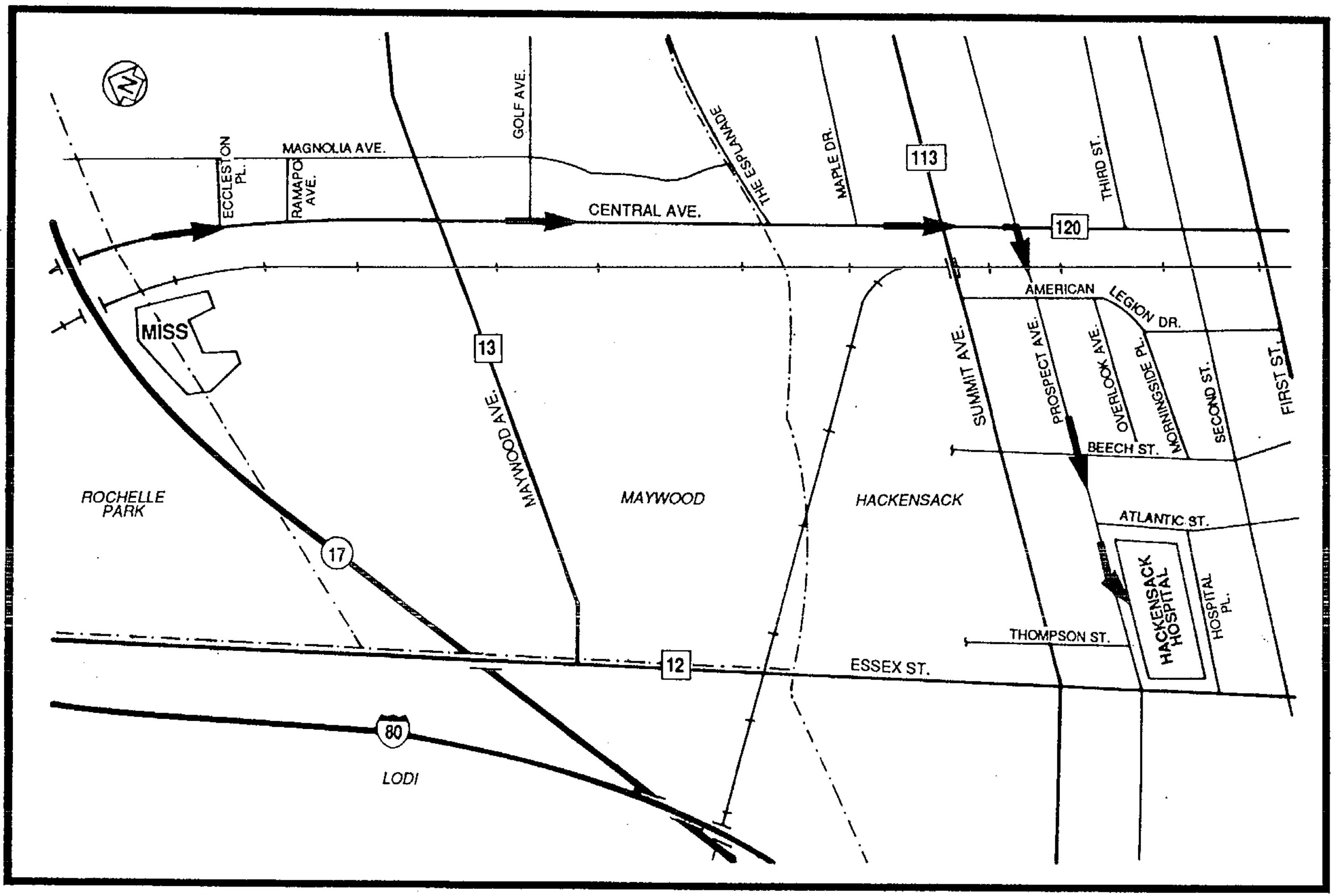

Figure 8-1
Route to the Local Hospital from MISS

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APPENDIX A

SUMMARY OF DATA COLLECTED DURING CHARACTERIZATION ACTIVITIES AT THE MAYWOOD SITE BETWEEN 1984 AND 1988

APPENDIX A

During initial scoping activities, historical information and data from previous characterization work were reviewed and incorporated into the planning for the current characterization effort. The information is summarized below.

- During scoping activities, numerous documents concerning activities at the site and vicinity properties and their current status were collected.

- The site has been used for or associated with various chemical plant activities since 1895. One of the major activities at Maywood Chemical Works was the extraction of thorium from monazite sands. This activity occurred from 1916 to 1956.

- Bedrock consists of the Brunswick Formation, a sandstone overlain with glacial till (a heterogeneous mixture of cobbles, sand, silt, and clay). The surface materials are mixed with building rubble and processed monazite sands.

- Shallow groundwater lies within several feet of the surface.

- The land surface has been modified considerably over the period of operations.

- Based on previous to presently available aerial photographs, Westerley Brook may at one time have been a tributary to Lodi Brook. Westerley Brook currently flows to the Saddle River through a 78-in. pipe beneath MISS. Westerley Brook was dammed and used as settling ponds during thorium extraction operations.

- Several inorganic compounds of thorium and lithium were associated with site activities (see Table A-1) (BNI 1987).

- A variety of organic chemicals have been identified in samples of groundwater from the site and in samples of sludges located during the installation of an interim storage facility for contaminated soils (see Table A-1).

- The primary radiological contaminant at the site is thorium-232, with lesser amounts of uranium-238 and radium-226.

- Numerous characterizations have been performed on the site and vicinity properties. In 1986, BNI performed a radiological characterization, which included a limited chemical characterization (BNI 1987). The principal findings of this characterization are discussed below.

  - Near-surface gamma radiation measurements on the property ranged from a background level of 5,000 counts per minute (cpm) to approximately 994,000 cpm. A measurement of 11,000 cpm is approximately equal to the DOE guideline of 5 pCi/g for the first 15 cm of soil. Thirteen biased surface soil sampling locations were selected. Results showed concentrations of thorium-232 and radium-226 in excess of DOE guidelines, with maximum concentrations of 95.2 pCi/g and 7.9 pCi/g, respectively. The maximum uranium-238 concentration was less than 68.7 pCi/g; however, DOE guidelines for uranium in soil have not yet been established for MISS. These data indicated surface contamination covering a total area of 40,000 yd^2 (Figure A-1). This total excludes any contamination under the existing storage pile and the area cleared for an additional storage pile, although data from a previous survey (Morton 1981) indicated surface and subsurface contamination in these areas.

- Surface sediment samples collected from a storm drain and two manholes were analyzed for radium-226 and thorium-232. The concentrations in these samples ranged from a background of 1.7 pCi/g to 18.3 pCi/g for thorium-232, and from a background of 0.8 pCi/g to 5.4 pCi/g for radium-226.

- Boreholes were drilled onsite to provide subsurface radiological data. Downhole gamma logging was performed, and the results showed a range from the background level of 2,000 cpm to approximately 4,500,000 cpm. A measurement of 40,000 cpm is approximately equal to the DOE guideline for subsurface contamination of 15 pCi/g per 15-cm increment at a depth greater than 15 cm. Analytical results for subsurface soil samples are consistent with the gamma logging data. Analyses of subsurface samples indicated thorium-232 concentrations ranging from background levels to 1,699 pCi/g, radium-226 concentrations ranging from background levels to 447 pCi/g, and uranium-238 concentrations from less than 7 to 304 pCi/g.

- The results of a limited chemical characterization indicated that chemical contamination is commingled with the radioactive contamination. Results from volatile organic analyses (VOA) indicated chemical contamination from benzene and toluene at specific locations. Analysis of the base/neutral and acid extractables (BNAEs) showed a possible cluster of contaminated boreholes where radioactive contamination was also identified. Analytical results for the priority pollutant metals indicated a number of hazardous constituents with concentrations above background levels. Results of the analyses for pesticides and polychlorinated biphenyls (PCBs) showed no detectable levels of these constituents; analyses for Resource Conservation and Recovery Act (RCRA) characteristics [i.e., ignitability, corrosivity, reactivity, and the extraction procedure (EP) toxicity test] showed only trace levels on the EP toxicity test.

- Radon gas detectors are maintained onsite near the storage pile and at approximately equal intervals along the site perimeter. One of the detectors is designated for quality control. The locations of the radon monitors are shown in Figure A-2.

  Terradex paired Type F and Type M Track-Etch detectors are used to monitor for radon and thoron. Although this technique is experimental, it is the only one commercially available for detecting thoron at environmental levels. Table A-2 lists the annual average concentrations of thoron and radon recorded at MISS from 1984 through 1988 (BNI 1985-1989).

- External gamma radiation levels were measured at 12 monitoring locations, which correspond to the radon detector locations shown in Figure A-2. The external gamma radiation levels are measured using lithium fluoride (LiF) thermoluminescent dosimeters (TLDs), which are exchanged quarterly. Each dosimeter contains five TLD chips, the responses of which are averaged. Analyses are performed by TMA/Eberline (TMA/E). Table A-3 lists the annual average external gamma radiation levels (background subtracted) recorded at MISS from 1984 through 1988 (BNI 1985-1989).

- Surface water sampling locations (Figure A-3) were established on the Saddle River (Location 1) and on Westerly Brook (Locations 2, 3, and 4). Location 4 was originally accessible by way of a manhole, which has been welded shut and is no longer accessible. Locations 5 and 6 were established on the Ballod property west of MISS; however, standing water is not usually present at these locations during quarterly sampling. Surface water collection locations were selected based on migration potential and discharge routes from the site. Because surface water runoff from the site discharges underground via Westerly Brook, samples were collected both upstream (Location 3) and downstream (Locations 1 and 2) of the site.

Table A-4 lists the annual average concentrations of total uranium, radium-226, and thorium-232 in surface water for 1984 through 1988 (BNI 1985-1989).

- Groundwater samples are collected quarterly from onsite wells (see Figure A-3). All wells identified with the letter "A" monitor the shallow aquifer. Wells identified with the letter "B" monitor the bedrock aquifer. Wells 2A and 2B are upgradient monitoring locations for the MISS storage pile. All other wells are generally downgradient monitoring locations. Well locations were selected on the basis of available geohydrological data.

  Table A-5 lists the annual average concentrations of total uranium, radium-226, and thorium-232 in groundwater for 1985 through 1988 (BNI 1986-1989).

- In 1984, Emergency Groundwater Permit No. NJ0054500 was issued by the New Jersey Department of Environmental Protection (NJDEP), Water Resources Division, pending processing of the routine permit application. NJDEP regulates interim storage of waste at MISS, and the emergency permit prohibits discharges of water to groundwater. One of the NJPDES permit requirements was the installation of groundwater monitoring wells at MISS, which was completed during 1985.

  In accordance with the permit requirements, chemical analyses were performed on samples collected from the groundwater monitoring wells shown in Figure A-3. The permit requires that groundwater samples from MISS be analyzed for various chemical constituents. Samples are analyzed quarterly for pH, total organic carbon (TOC), total organic halides (TOX), and specific conductance. Once a year, analyses are performed for New Jersey priority pollutants. Tables A-6 through A-9 list the chemical contaminants found in groundwater from 1985 through 1988, respectively. Tables A-10 through A-13 list the chemical contaminants for which concentrations were below the analytical limit of sensitivity from 1985 through 1988, respectively.

FIGURES FOR APPENDIX A

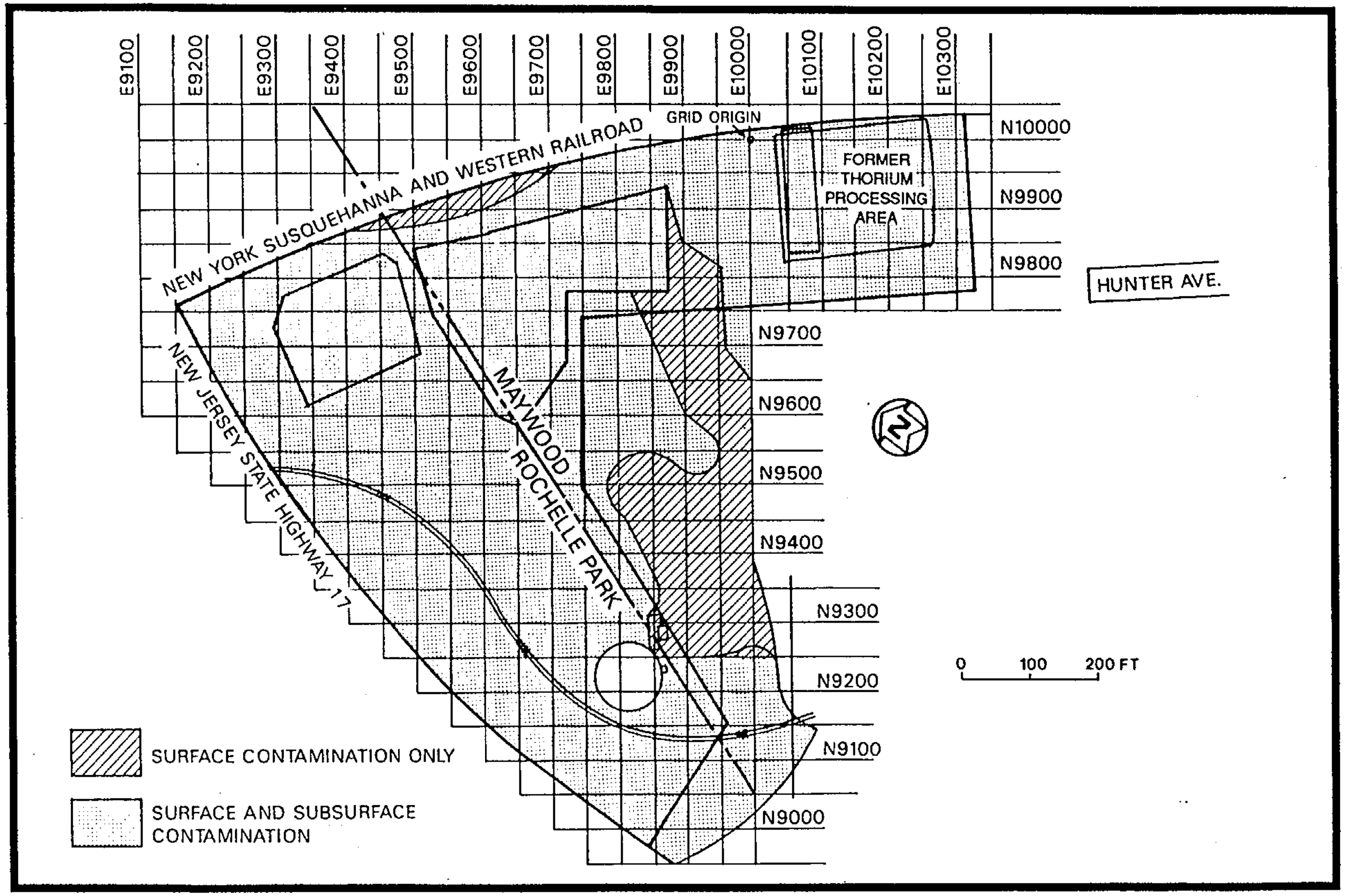

Figure A-1
Areas of Surface and Subsurface Contamination at MISS

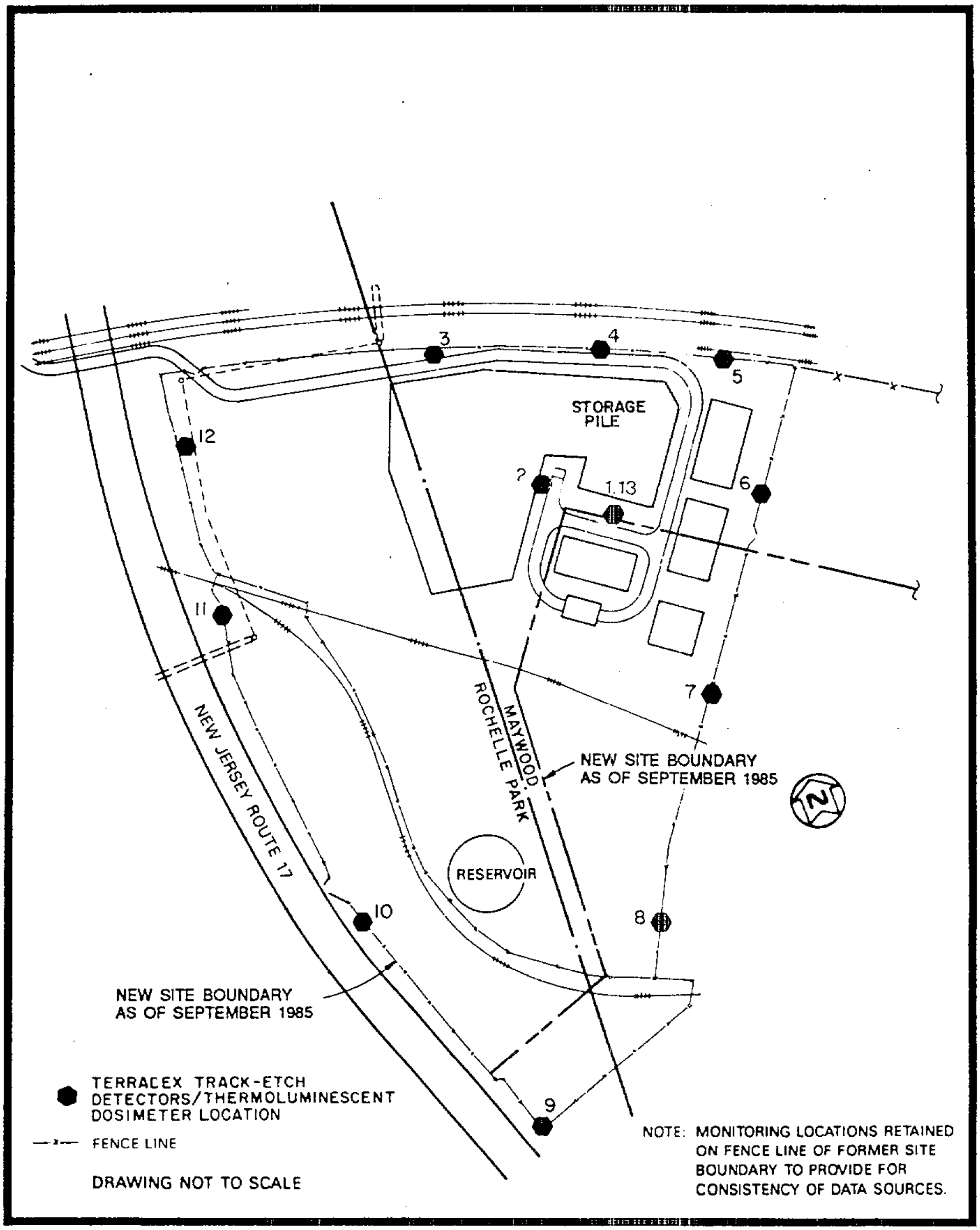

Figure A-2
Radon and External Gamma Radiation Monitoring Locations at MISS

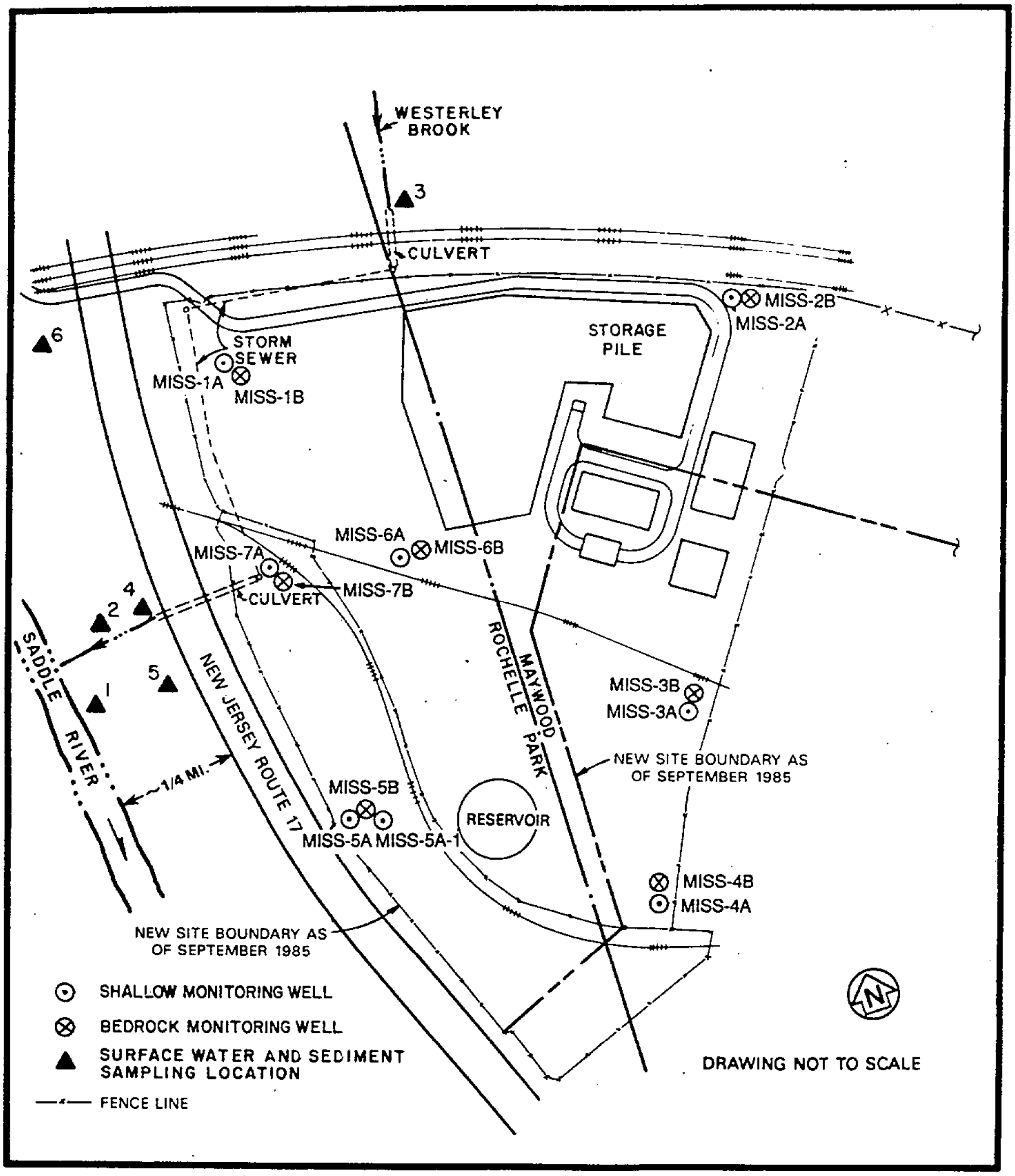

Figure A-3
Surface Water, Groundwater, and Sediment Sampling Locations in the Vicinity of MISS

TABLES FOR APPENDIX A

Table A-1

Chemicals Associated with MISS

Organics Detected in Groundwater
- 1,1,1-Trichloroethane
- Tetrachloroethylene
- 1,2-trans-Dichloroethene
- Benzene
- Toluene
- Methylene chloride
- Chloroform
- Bis(2-ethylhexyl)phthalate
- Di-n-octyl phthalate
- 1,1,2,2,-Tetrachloroethane
- Vinyl chloride

Organics In Sludges
- Phenol
- Hexane
- Fluoranthene
- Di-n-butyl phthalate
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Chrysene
- Phenanthrene
- Pyrene

Inorganics
- Thorium
- Thorium nitrate
- Thorium oxide
- Thorium phosphate
- Lithium hydroxide
- Lithium chloride
- Rare earths

Source: BNI 1987.

Table A-2

Annual Average Concentrations of Thoron and Radon at MISS, 1984-1988[a]

Page 1 of 2

Sampling Location[b]	Concentration (10^{-9} μCi/ml)[c,d,e]				
	1984	1985	1986	1987	1988
Thoron (Rn-220)					
1	8.1	0.5	<MDL	0.2	0.4
2	2.1	0.6	<MDL	0.3	0.5
3	2.1	0.3	0.1	0.4	0.2
4	1.4	0.5	<MDL	<MDL	1.4
5	9.9	3.2	9.2	9.2	6.4
6	1.1	1.0	0.6	1.3	1.0
7	0.2	0.3	<MDL	0.5	0.3
8	0.6	0.02	0.07	0.4	0.1
9	<MDL	0.2	<MDL	0.1	0.2
10	2.1	2.7	6.0	4.0	0.5
11	<MDL	0.2	0.04	0.1	0.4
12	1.4	1.2	1.7	1.7	0.6
13[f]	1.2	2.9	0.6	0.2	0.1
Background[g]					
14[h]	<MDL	0.1	0.4	0.3	<MDL
Radon (Rn-222)					
1	0.9	0.3	0.6	0.7	0.6
2	0.8	0.2	1.2	1.2	0.9
3	0.9	0.3	1.2	1.5	0.6
4	0.8	0.4	1.6	1.1	1.9
5	1.3	0.5	9.9	9.7	7.4
6	1.2	0.2	1.9	2.4	1.4
7	0.9	0.2	0.9	1.1	0.8
8	0.6	0.3	0.8	1.0	0.4
9	1.0	0.2	0.9	1.1	0.5

Table A-2

(continued)

Page 2 of 2

Sampling Location[b]	Concentration (10^{-9} μCi/ml)[c,d,e]				
	1984	1985	1986	1987	1988
Radon (Rn-222) (cont'd)					
10	0.8	0.4	6.5	4.9	1.0
11	2.7	0.2	1.3	0.8	0.8
12	1.4	0.2	2.6	2.3	1.1
13	0.7	0.3	1.2	1.1	0.4
Background[g]					
14[h]	1.3	0.4	1.0	0.8	0.3

[a]Sources for data are the annual site environmental reports (BNI 1985-1989).

[b]Sampling locations are shown in Figure A-2.

[c]1×10^{-9} μCi/ml is equivalent to 1 pCi/L.

[d]All results include background.

[e]MDL means minimum detectable limit.

[f]Location 13 is a quality control for Location 1.

[g]Additional background detectors were established in January 1989 at the Rochelle Park Post Office and the Rochelle Park Fire Station, both of which are located approximately 0.8 km (0.5 mi) south of MISS. Data from these detectors were reported in the 1989 environmental report.

[h]The background detector is located at the Department of Health, Paterson, New Jersey, approximately 22 km (14 mi) west of MISS.

Table A-3

Annual Average External Gamma Radiation Levels at MISS, 1984-1988[a]

Page 1 of 2

Sampling Location[b]	Radiation Level (mR/yr)[c] 1984	1985	1986	1987	1988
Boundary					
3	196	27	38	29	21
4	182	130	91	69	109
5	368	272	172	121	186
6	287	106	83	67	85
7	147	15	24	36	16
8	148	15	18	37	30
9	176	38	23	39	32
10[d]	759	627	496	521	317
11	90	57	50	61	59
12	208	180	88	79	106
On-Site					
1	91	48	41	36	40
2	89	50	51	43	52
13[e]	80	46	35	33	39
Background[f]					
14[g]	-[g]	108	63	58	78

[a]Sources for data are the annual site environmental reports (BNI 1985-1989).

[b]Sampling locations are shown in Figure A-2.

[c]Measured background has been subtracted at onsite and boundary locations.

Table A-3

(continued)

Page 2 of 2

[d]Location 10 is in an area of known contamination (Morton 1981).

[e]Location 13 is a quality control for Location 1.

[f]Additional background locations were established in April 1988 at the Rochelle Park Post Office and the Rochelle Park Fire Station, both of which are approximately 0.8 km (0.5 mi) south of MISS. No values are reported for this year because the TLDs had not yet had a full year of exposure. Data for these locations were presented in the 1989 environmental report.

[g]The background detector is located at the Department of Health, Paterson, New Jersey, approximately 22 km (14 mi) west of MISS.

Table A-4

Annual Average Concentrations of Total Uranium, Radium-226, and Thorium-232 in Surface Water at MISS, 1984-1988[a]

Sampling Location[b]	Concentration (10^{-9} μCi/ml)[c,d] 1984	1985	1986	1987	1988
Total Uranium					
1	3.0	<3.0	<3.0	<3.0	3.0
2	3.0	<3.0	<3.0	<3.0	4.3
3[e]	3.0	<3.0	<3.0	<3.0	3.8
Radium-226					
1	0.4	0.2	0.4	0.4	0.4
2	0.2	0.4	0.4	0.2	0.3
3[e]	0.7	0.4	0.6	0.3	0.3
Thorium-232					
1	0.4	0.2	<0.1	<0.1	<0.1
2	0.5	0.1	0.1	<0.1	<0.1
3[e]	0.4	0.1	0.1	<0.1	0.1

[a]Sources for 1984, 1985, 1986, 1987, and 1988 data are the annual site environmental reports for those years (BNI 1985-1989).

[b]Sampling locations are shown in Figure A-3. Locations 4, 5, and 6 are not reported because there were no data for these locations for 1986-1988; only limited data are available for prior years.

[c]1×10^{-9} μCi/ml is equivalent to 1 pCi/L.

[d]All results include background.

[e]Location 3 is upstream of MISS and represents background.

Table A-5

Annual Average Concentrations of Total Uranium, Radium-226, and Thorium-232 in Groundwater at MISS, 1985-1988[a]

Page 1 of 3

Sampling Location[b]	Concentration (10^{-9} μCi/ml)[c]			
	1985	1986	1987	1988
Total Uranium				
1A	27.0	-[d]	-[d]	-[d]
1B	<3.0	1.6	3.3	2.4
2A	3.0	0.6	2.4	1.4
2B	12.0	0.5	2.1	0.8
3A	<3.0	0.6	2.0	1.5
3B	<3.0	0.3	3.3	1.3
4A	<3.0	-[d]	-[d]	3.9
4B	<3.0	0.5	2.0	0.7
5A	63.0	100.0	98.8	-[d]
5A-1	-[d]	-[d]	-[d]	-[d]
5B	<3.0	0.3	1.5	0.7
6A	9.0	8.4	12.1	8.4
6B	5.0	0.8	2.2	1.1
7A	-[d]	-[d]	15.9	-[d]
7B	12.0	4.7	5.0	6.3
Background				
B38W04B[e]	-[e]	-[e]	-[e]	0.8
Radium-226				
1A	0.1	-[d]	-[d]	-[d]
1B	0.6	0.6	0.4	0.9
2A	0.4	0.5	0.4	1.0
2B	0.3	1.5	0.4	0.7
3A	0.4	0.6	0.6	1.2

Table A-5

(continued)

Page 2 of 3

Sampling Location[b]	Concentration (10^{-9} μCi/ml)[c]			
	1985	1986	1987	1988
Radium-226 (cont'd)				
3B	0.3	0.5	0.3	0.8
4A	0.4	-[d]	-[d]	2.8
4B	0.3	0.4	0.5	1.4
5A	0.2	0.6	0.8	-[d]
5A-1	-[d]	-[d]	-[d]	-[d]
5B	0.3	0.2	0.3	0.7
6A	0.2	0.4	0.5	2.0
6B	0.4	0.5	0.3	0.7
7A	-[d]	-[d]	0.1	-[d]
7B	0.3	0.4	0.3	1.5
Background				
B38W04B[e]	-[e]	-[e]	-[e]	1.0
Thorium-232				
1A	0.1	-[d]	-[d]	-[d]
1B	<0.1	<0.2	<0.3	<0.3
2A	0.3	<0.2	<0.1	0.4
2B	<0.2	<0.2	<0.1	<0.3
3A	<0.1	<0.2	<0.1	0.7
3B	<0.2	<0.1	<0.2	<0.3
4A	<0.1	-[d]	-[d]	1.6
4B	<0.1	<0.1	<0.1	<0.2
5A	<0.1	0.3	0.3	-[d]
5A-1	-[d]	-[d]	-[d]	-[d]
5B	<0.2	<0.1	<0.1	<0.2

Table A-5

(continued)

Page 3 of 3

Sampling Location[b]	Concentration (10^{-9} μCi/ml)[c] 1985	1986	1987	1988
Thorium-232 (cont'd)				
6A	<0.2	0.1	0.3	<0.2
6B	<0.3	<0.2	<0.1	0.3
7A	-[d]	-[d]	<0.1	-[d]
7B	<0.2	<0.2	<0.1	<0.3
Background				
B38W04B[e]	-[e]	-[e]	-[e]	<0.2

[a]Sources for data are the annual site environmental reports (BNI 1985-1989).

[b]Sampling locations are shown in Figure A-3.

[c]1 x 10^{-9} μCi/ml is equivalent to 1 pCi/L.

[d]These are shallow wells that are used to monitor groundwater in unconsolidated material. They typically do not contain water.

[e]This location is at Stepan Company, approximately 61 m (200 ft) east of MISS wells 3A and 3B. The well was added to the monitoring program in April 1988 to represent background.

Table A-6

Concentrations of Chemical Contaminants in Groundwater at MISS, 1985[a]

Parameter (Units)	Range of Concentrations by Sampling Location (Monitoring Well Number)[b]										
	1B	2A[c]	2B[c]	3A	3B	4B	5A	5B	6A	6B	7B
Methylene chloride (µg/L)	108	1087	169	233	267	302	ND	100	175	145	512
Trichloroethene (µg/L)	66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND/9
Bis(2-ethylhexyl) phthalate (µg/L)	44/190	24/350	ND/53	ND/110	54/75	12/29	29	120/1200	57/61	ND/290	ND/36
Chloroform (µg/L)	ND	39	ND	ND	ND	ND	ND	ND	31	ND	27
Toluene (µg/L)	ND	41	ND	33	31	20/55	ND	ND	25	26	16
Di-n-octyl phthalate (µg/L)	ND	41	27	ND	ND	ND	ND	ND	ND	ND	ND
Benzene (µg/L)	ND	ND	143/150	ND	ND	420/1240	ND	ND	ND	ND	ND
Tetrachloroethene (µg/L)	ND/130	ND/110	ND/30	42/90	ND/25	ND/170	ND	ND/660	ND	ND	ND/7
trans-1,2-Dichloro-ethane (µg/L)	ND/7	ND	ND	ND	ND	1100/2964	ND	ND/33	ND/26	ND/100	ND/110
								ND	ND	ND	ND/17
1,1,2,2-Tetrachloro-ethene (µg/L)	ND	ND	ND	ND	ND	13	ND	ND	ND	ND	ND
Vinyl chloride (µg/L)	ND	ND	ND	ND	ND	ND/220	ND	ND	ND	ND	ND
Total organic carbon (mg/L)	2/100	21/305	15/130	2/165	6/70	18/79	33	17/30	10/78	10/23	12/62
Total organic halide (µg/L)	99/572	78/841	182/1332	58/381	51/553	498/1465	113	74/216	58/140	100/220	80/164
Specific conductance (µmhos/cm)	724/9937	700/7683	7460/10130	763/1210	2555/3530	1222/1780	2428	3258/3375	1879/3000	2887/4185	5542/7450
pH (pH units)	6.9/7.4	6.8/7.3	6.8/7.3	3.9/5.6	5.9/6.3	6.3/7.1	5.46	6.7/6.9	6.9/7.3	9.0/9.5	7.1/7.5
Arsenic[d] (mg/L)	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium[d] (mg/L)	0.05	0.07	ND	3.5	0.007	0.03	ND	0.03	0.06	0.08	0.007
Boron[d] (mg/L)	ND	2.2	2.2	0.1	0.3	0.13	ND	1.0	12	0.7	15
Calcium[d] (mg/L)	85	220	300	66	200	150	ND	190	190	20	220
Chromium[d] (mg/L)	ND	2.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron[d] (mg/L)	0.03	3.8	0.05	2.7	ND	ND	ND	ND	0.07	2.7	0.05
Lead[d] (mg/L)	ND	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium[d] (mg/L)	550	12	100	15	53	15	ND	7.9	45	10	73
Manganese[d] (mg/L)	26	0.58	0.42	1.9	15	3.4	ND	0.1	0.29	0.23	0.8
Potassium[d] (mg/L)	42	57	190	28	89	53	ND	310	110	52	190
Silicon[d] (mg/L)	3	19	8	14	5.8	7.5	ND	86	78	48	35
Sodium[d] (mg/L)	74	2800	2800	35	320	190	ND	290	65	870	1800

Table A-6

(continued)

Parameter (Units)	Range of Concentrations by Sampling Location (Monitoring Well Number)[b]										
	1B	2A[c]	2B[c]	3A	3B	4B	5A	5B	6A	6B	7B
Strontium[d] (mg/L)	0.12	0.57	0.38	ND	0.3	0.21	ND	0.45	1.5	0.12	0.25
Tin[d] (mg/L)	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium[d] (mg/L)	ND	3.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc[d] (mg/L)	ND	ND	ND	0.04	0.02	ND	ND	ND	1.0	0.03	ND

[a]Does not include parameters for which concentrations were below the limit of sensitivity of the analytical method and therefore undetectable.

[b]ND - No detectable concentration. Where only one value is listed, only one sample was analyzed.

[c]Upgradient well.

[d]Analyzed for dissolved metal.

Table A-7

Concentrations of Chemical Contaminants in Groundwater at MISS, 1986[a]

Parameter (Units)	Range of Concentrations by Sampling Location (Monitoring Well Number)[b]											
	1B	2A[c]	2B[c]	3A	3B	4A	4B	5A	5B	6A	6B	7B
pH (standard units)	7.0-7.2	7.0-7.2	6.9-7.3	5.8-6.1	6.1-6.4	6.55	7.0-7.5	6.30	7.1-7.5	6.8-6.9	9.0-9.3	7.1-7.4
Total organic carbon (mg/L)	2.1-7.3	54-154	58-154	4-9	8-18	14	16-32	9	12-22	8-74	9-38	4-41
Total organic halide (μg/L)	28-70	28-410	17-900	53-171	57-152	19	111-400	24	81-110	ND-35	24-40	26-79
Specific conductance (μmhos/cm)	785-990	5625-7400	8825-10500	980-1072	2050-3200	1650	1720-1910	2500	2388-3300	2450-2700	3100-4100	6275-8500
Benzene (μg/L)	ND	ND	180	ND	47	ND	28	ND	ND	ND	ND	ND
Chloroform (μg/L)	ND	ND	ND	ND	ND	ND	17	ND	ND	ND	ND	ND
Methylene chloride (μg/L)	ND	ND	ND	95	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethane (μg/L)	40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	51
Toluene (μg/L)	ND	ND	11	ND	ND	ND	ND	ND	25	9	ND	ND
1,1,1-Trichloroethene (μg/L)	6.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-trans-Dichloroethene (μg/L)	6.3	ND	ND	ND	ND	ND	21	ND	ND	ND	ND	19
Trichloroethene (μg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16

[a]Does not include parameters for which concentrations were below the limit of sensitivity of the analytical method used.

[b]ND - No detectable concentration. Where only one value is listed, only one sample was analyzed.

[c]Upgradient well.

Table A-8

Concentrations of Chemical Contaminants in Groundwater at MISS, 1987[a]

Parameter (Units)	Range of Concentrations by Sampling Location (Monitoring Well Number)[b]												
	1B	2A[c]	2B[c]	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B
pH (standard units)	7.0-7.9	6.9-7.7	7.0-7.6	4.8-6.2	5.9-6.3	6.2	7.0-8.5	6.6	6.9-8.3	6.9-8.9	8.3-9.5	7.1	7.1-7.4
Total organic carbon (mg/L)	2.7-7.8	49-119	62-118	6.2-6.2	6-35	10	17-25	12	14-18	6-71	10-16	3.5	78-26
Total organic halide (μg/L)	10-51	11-63	10-330	40-110	30-150	10	22-86	10	12-410	10-30	35-107	10	10-92
Specific conductance (μmhos/cm)	805-853	3800-6310	9490-10600	800-920	1380-2300	2000	1250-1800	3000	2600-4500	1850-2940	2000-3500	600	6740-8500
Benzene (μg/L)	ND	ND	150	ND	ND	ND	ND	ND	160	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	ND	ND	ND	ND	ND	16	ND	ND	21	ND	ND	ND
1,2-Trans-dichloroethene (μg/L)	ND	ND	ND	ND	ND	ND	78	ND	ND	ND	ND	ND	15
Trichloroethene (μg/L)	16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (μg/L)	16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	31

[a]Does not include parameters for which concentrations were below the limit of sensitivity of the analytical method used.

[b]ND - No detectable concentration. Where only one value is listed, only one sample was analyzed.

[c]Upgradient well.

Table A-9

Analysis Results for Indicator Parameters and Chemical Contaminants in Groundwater at MISS, 1988[a]

Parameter	Sampling Location (Monitoring Well Number)										
	1B	2A[b]	2B[b]	3A	3B	4A	4B	5B	6A	6B	7B
pH (standard units)	7.1-7.4	7.0-7.2	7.2-8.0	5.3-7.6	6.1-6.4	4.7-5.3	7.1-7.2	7.2-8.4	6.8-7.0	8.2-8.9	7.2-8.5
Total organic carbon (mg/L)	2.5-36.5	21.7-115	22.4-70.1	3.8-7.7	3.5-6.8	5.7-6.0	15.3-19.3	8.2-11.9	6.3-8.8	5.9-9.0	3.4-14.5
Total organic halide (μg/L)	ND-82[c]	24-260	ND-130	21-45	23-70	28-29	ND-150	ND-430	12-32	ND-78	ND-330
Specific conductance (μmhos/cm) 4810-7720	788-896	4700-6990	1090-9750	720-831	1230-2720	1440-1730	1450-1660	2330-3590	2560-2690	2410-3670	
Bis(2-ethylhexyl)phthalate (μg/L)	ND	ND	15	11	13	ND	ND	35	ND	ND	11
Methylene chloride (μg/L)	10	ND	ND	ND	6	10	32	7	8	8	9
Acetone (μg/L)	12	ND	18	ND	ND	ND	ND	ND	ND	ND	ND
Benzene (μg/L)	ND	ND	62	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (μg/L)	17	ND	ND	ND	ND	ND	ND	ND	ND	ND	77
1,2-Dichloroethene (μg/L)	ND	ND	ND	ND	ND	ND	26	ND	ND	ND	7
1,1,1-Trichloroethane (μg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Trichloroethene (μg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5

[a]Does not include parameters for which concentrations were below the limit of sensitivity of the analytical method used.

[b]Upgradient well.

[c]ND - No detectable concentration.

Table A-10

Chemical Contaminants for Which Concentrations in Groundwater at MISS were below the Analytical Limit of Sensitivity, 1985[a]

Acrolein	Diethyl phthalate	Endrin
Acrylonitrile	Dimethyl phthalate	Endrin aldehyde
Bromodichloromethane	2,4-Dinitrotoluene	Heptachlor
Bromoform	2,6-Dinitrotoluene	Heptachlor epoxide
Bromomethane	1,2-Diphenylhydrazine	4,4'-DDT
Carbon tetrachloride	Fluoranthene	4,4'-DDE
Chlorobenzene	Fluorene	4,4'-DDD
Chlorodibromomethane	Hexachlorobenzene	PCB 1016
Chloroethane	Hexachlorobutadiene	PCB 1221
2-Chloroethyl vinyl ether	Hexachloroethane	PCB 1232
Chloromethane	Hexachlorocyclopentadiene	PCB 1242
Dichlorodifluoromethane	Indeno(1,2,3-cd)pyrene	PCB 1248
1,1-Dichloroethane	Isophorone	PCB 1254
1,2-Dichloroethane	Naphthalene	PCB 1260
1,1-Dichloroethene	Nitrobenzene	Toxaphene
1,2-Dichloropropane	N-Nitrosodimethylamine	Antimony
1,3-Dichloropropene	N-Nitrosodi-n-propylamine	Beryllium
Ethylbenzene	N-Nitrosodiphenylamine	Cadmium
1,1,1-Trichloroethane	Phenanthrene	Cobalt
1,1,2-Trichloroethane	Pyrene	Copper
Trichlorofluoromethane	1,2,4-Trichlorobenzene	Molybdenum
Acenaphthene	2,3,7,8-Tetrachlorodibenzo-p-dioxin	Nickel
Acenaphthylene	4-Chloro-3-methylphenol	Scandium
Benzo(a)anthracene	2-Chlorophenol	Selenium
Benzo(b)fluoranthene	2,4-Dichlorophenol	Silver
Benzo(k)fluoranthene	2,4-Dimethylphenol	Thallium
Benzo(a)pyrene	2,4-Dinitrophenol	
Benzo(g,h,i)perylene	2-Methyl-4,6-dinitrophenol	
Benzidine	2-Nitrophenol	
Bis(2-chloroethyl)ether	4-Nitrophenol	
Bis(2-chloroethoxy)methane	Pentachlorophenol	
Bis(2-chloroisopropyl)ether	Phenol	
4-Bromphenyl phenyl ether	2,4,6-Trichlorophenol	
Butylbenzyl phthalate	Aldrin	
2-Chloronaphthalene	Alpha-BHC	
4-Chlorophenyl phenyl ether	Beta-BHC	
Chrysene	Gamma-BHC	
Dibenzo(a,h)anthracene	Delta-BHC	
Di-n-butyl phthalate	Chlordane	
1,2-Dichlorobenzene	Dieldrin	
1,3-Dichlorobenzene	Alpha-endosulfan	
1,4-Dichlorobenzene	Beta-endosulfan	
3,3-Dichlorobenzidine	Endosulfan sulfate	

[a]Analysis for these parameters required to meet NJDEP permit requirements.

Table A-11

Chemical Contaminants for Which Concentrations in Groundwater at MISS were below the Analytical Limit of Sensitivity, 1986[a]

Acrolein
Acrylonitrile
Bromoform
Carbon tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
2-Chloroethyl vinyl ether
Dichlorobromomethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
1,2-Dichloropropane
1,3-Dichloropropene
Ethylbenzene
Methylene chloride
Methyl bromide
Methyl chloride
1,1,2,2-Tetrachloroethane
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Vinyl chloride
Anthracene
Acenaphthene
Acenaphthylene
Benzo(a)anthracene
Benzo(k)fluoranthene
Benzo(a)pyrene
Benzo(g,h,i)perylene
Benzidine
Bis(2-chloroethyl)ether
Bis(2-chloroethoxy)methane
Bis(2-Chloroisopropyl)ether
Bis(2-Ethylhexyl)phthalate
3,4-Benzofluoranthene
4-Bromophenyl phenyl ether
Butylbenzyl phthalate
2-Chloronaphthalene
4-Chlorophenyl phenyl ether
Chrysene
Dibenzo(a,h)anthracene
Di-n-butyl phthalate
Di-o-octyl phthalate
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
3,3-dichlorobenzidine
Diethyl phthalate
Dimethyl phthalate
2,4-Dinitrotoluene
2,6-Dinitrotoluene
1,2-Diphenylhydrazine
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachloroethane
Hexachlorocyclopentadiene
Indeno(1,2,3-cd)pyrene
Isophorone
Naphthalene
Nitrobenzene
n-Nitrosodimethylamine
n-Nitrosodi-n-propylamine
Phenanthrene
Pyrene
1,2,4-Trichlorobenzene
2-Chlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
4,6-Dinitro-o-cresol
p-Chloro-m-cresol
2,4-Dinitrophenol
2-Nitrophenol
4-Nitrophenol
Pentachlorophenol
Phenol
2,4,6-Trichlorophenol
Aldrin
Alpha-BHC
Beta-BHC
Gamma-BHC
Delta-BHC
Chlordane
Dieldrin
Alpha-endosulfan
Beta-endosulfan
Endosulfan sulfate
Endrin
Heptachlor
Heptachlor epoxide
4,4'-DDT
4,4'-DDE
4,4'-DDD
PCB 1016
PCB 1221
PCB 1232
PCB 1242
PCB 1248
PCB 1254
PCB 1260

[a]Analyses for these parameters were required to meet NJDEP permit requirements.

Table A-12

Chemical Contaminants for Which Concentrations in Groundwater at MISS were below the Analytical Limit of Sensitivity, 1987[a]

Acrolein	Bis(2-chloroethoxy) methane	2-Chlorophenol
Acrylonitrile	Bis(2-Chloroisopropyl) ether	2,4-Dichlorophenol
Bromoform	3,4-Benzofluoranthene	2,4-Dimethylphenol
Carbon tetrachloride	4-Bromophenyl phenyl ether	4,6-Dinitro-o-cresol
Chlorobenzene	Butylbenzyl phthalate	p-chloro-m-cresol
Chlorodibromomethane	2-Chloronaphthalene	2,4-Dinitrophenol
Chloroethane	4-Chlorophenyl phenyl ether	2-Nitrophenol
2-Chloroethyl vinyl ether	Chrysene	4-Nitrophenol
Chloroform	Dibenzo(a,h)anthracene	Pentachlorophenol
Dichlorobromomethane	Di-n-butyl phthalate	Phenol
Dichlorodifluoromethane	Di-n-octyl phthalate	2,4,6-Trichlorophenol
1,3-Dichloropylene	1,2-Dichlorobenzene	Aldrin
1,1-Dichloroethane	1,3 Dichlorobenzene	Alpha-BHC
1,2-Dichloroethane	1,4-Dichlorobenzene	Beta-BHC
1,1-Dichloroethene	3,3-Dichlorobenzidine	Gamma-BHC
1,2-Dichloropropane	Diethyl phthalate	Delta-BHC
1,3-Dichloropropene	Dimethyl phthalate	Chlordane
Ethylbenzene	2,4-Dinitrotoluene	Dieldrin
Methylene chloride	2,6-Dinitrotoluene	Alpha-endosulfan
Methyl bromide	1,2-Diphenylhydrazine	Beta-endosulfan
Methyl chloride	Fluoranthene	Endosulfan sulfate
1,1,2,2-Tetrachloroethane	Fluorene	Endrin
Trichlorofluoromethane	Hexachlorobenzene	Endrin aldehyde
1,1,1-Trichloroethane	Hexachlorobutadiene	Heptachlor
1,1,2-Trichloroethane	Hexachloroethane	Heptachlor epoxide
Toluene	Hexachlorocyclopentadiene	4,4'-DDT
Vinyl chloride	Indeno(1,2,3-cd)pyrene	4,4'-DDE
Anthracene	Isophorone	4,4'-DDD
Acenaphthene	Naphthalene	PCB 1016
Acenaphthylene	Nitrobenzene	PCB 1221
Benzo(a)anthracene	N-Nitrosodiphenylamine	PCB 1232
Benzo(k)fluoranthene	N-Nitrosodimethylamine	PCB 1242
Benzo(a)pyrene	N-Nitrosodi-n-propylamine	PCB 1248
Benzo(g,h,i)perylene	Phenanthrene	PCB 1254
Benzidine	Pyrene	PCB 1260
Bis(2-chloroethyl) ether	1,2,4-Trichlorobenzene	

[a]Analysis for the parameters required to meet NJDEP permit requirements.

Table A-13

Chemical Contaminants not Detected in Groundwater at MISS, 1988[a]

Acrolein	4-Bromophenyl phenyl ether	Pyrene
Acrylonitrile	Butylbenzyl phthalate	2-Chlorophenol
Bromoform	2-Chloronaphthalene	2,4-Dichlorophenol
Carbon tetrachloride	4-Chlorophenyl phenyl ether	2,4-Dimethylphenol
Chlorobenzene	4-Chloroaniline	2,4-Dinitrophenol
Chlorodibromomethane	4-Chloro-3-methylphenol	2-Nitrophenol
Chloroethane	Chrysene	4-Nitrophenol
Chloroform	Dibenzo(a,h)anthracene	Pentachlorophenol
2-Chloroethyl vinyl ether	Dibenzofuran	Phenol
Dichlorobromomethane	Di-n-butyl phthalate	2,4,5-Trichlorophenol
1,1-Dichloroethene	Di-n-octyl phthalate	2,4,6-Trichlorophenol
1,1-Dichloroethane	1,2-Dichlorobenzene	Aldrin
1,2-Dichloroethane	1,3-Dichlorobenzene	Alpha-BHC
1,2-Dichloropropane	1,4-Dichlorobenzene	Beta-BHC
1,3-Dichloropropene	3,3-Dichlorobenzidine	Gamma-BHC
Ethylbenzene	Diethyl phthalate	Delta-BHC
Methyl bromide	Dimethyl phthalate	Alpha-chlordane
Methyl chloride	2,4-Dinitrotoluene	Beta-chlordane
Toluene	2,6-Dinitrotoluene	Dieldrin
Total xylenes	4,6-Dinitro-2-methylphenol	Alpha-endosulfan
Styrene	Fluoranthene	Beta-endosulfan
1,1,2,2-Tetrachloroethane	Fluorene	Endosulfan sulfate
Trichlorofluoromethane	Hexachlorobenzene	Endrin
1,1,2-Trichloroethane	Hexachlorobutadiene	Endrin ketone
Vinyl chloride	Hexachloroethane	Heptachlor
Anthracene	Hexachlorocyclopentadiene	Heptachlor epoxide
Acenaphthene	Indeno(1,2,3-cd)pyrene	4,4'-DDT
Acenaphthylene	Isophorone	4,4'-DDE
Benzo(a)anthracene	2-Methylnapthalene	4,4'-DDD
Benzo(k)fluoranthene	2-Methylphenol	Methoxychlor
Benzo(a)pyrene	4-Methylphenol	PCB 1016
Benzo(g,h,i)perylene	Naphthalene	PCB 1221
Benzyl alcohol	Nitrobenzene	PCB 1232
Benzoic acid	2-Nitroaniline	PCB 1242
Bis(2-chloroethyl) ether	3-Nitroaniline	PCB 1248
Bis(2-chloroethoxy) methane	4-Nitroaniline	PCB 1254
Bis(2-chloroisopropyl) ether	N-Nitrosodi-n-propylamine	PCB 1260
	Phenanthrene	Toxaphene

[a]Analysis for the parameters required to meet NJDEP permit requirements.

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