Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

OSMOSE WOOD PRESERVING, Inc.

Buffalo, Erie County
Site Number 915143

January 1997

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* JOHN CAHILL, *Acting Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

OSMOSE WOOD PRESERVING, Inc.
Inactive Hazardous Waste Site
Buffalo, Erie County, New York
Site No. 915143

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedial action for the Osmose Wood Preserving inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law (ECL). The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Osmose Wood Preserving Inactive Hazardous Waste Site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A bibliography of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential threat to public health and the environment.

Description of Selected Remedy

Based upon the results of the Site Investigation/Feasibility Study for the Osmose Wood Preserving site and the criteria identified for evaluation of alternatives, the NYSDEC has selected a remedy consisting of removal of Light Non-Aqueous Phase Liquid (LNAPL) followed by ozone treatment of contaminated soils. The components of the remedy are as follows:

- Recovery of Light Non-Aqueous Phase Liquid (LNAPL).
- Incineration of recovered LNAPL at an off-site facility.
- Ozone treatment of soils.
- Groundwater monitoring for compliance.
- Monitoring of sanitary sewer and the sewer bedding well.

- Air Monitoring.
- Deed restriction.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this site as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

1/8/97
Date

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

TABLE OF CONTENTS

RECORD OF DECISION

OSMOSE WOOD PRESERVING, Inc.
Buffalo (C), Erie County, New York
Site No. 915143

SECTION 1: SITE LOCATION AND DESCRIPTION

The Osmose Wood Preserving site is approximately one half acre in size and is located at 980 Ellicott Street in the city of Buffalo. The site is in a commercial and residential area and is bounded by Main Street on the west, Dodge Street on the north, Ellicott Street on the east and Best Street on the south (Figs.1 & 2).

Most of the contamination on site lies under the company's parking lot, which is south of the main building. The parking lot is paved and is completely fenced in.

The site geology consists of about 60 feet thick unconsolidated clay, silt, sand and gravel deposits which is underlain by the Onondaga limestone bedrock. Fill mixed with silt and clay varies up to 5 feet below ground surface followed by low permeability silty clay from 7 to 12 feet. This is followed by highly permeable strata of sands and a mix of sands and gravel down to the bedrock. The bedrock surface slopes toward the southeast. The groundwater in the overburden flows toward the southeast.

SECTION 2: SITE HISTORY

2.1: Operational/Disposal History

The site has been owned and operated at this location by the Osmose Wood Preserving, Inc. since 1951. A variety of wood preserving chemicals are manufactured at this facility. Prior to 1989, two 12,000 gallon and one 10,000 gallon underground storage tanks were used to store creosote, fuel oil #2, coal tar, mineral spirits, isopropyl alcohol and a diacetone- alcohol mixture. The tanks were found leaking in 1989 and were excavated and removed from the site. The soil around the tanks impacted with creosote (U051 hazardous waste) and other contaminants was also excavated and temporarily piled on site. The contaminated piled soil was put into an on-site biocell for bioremediation.

Later environmental investigations showed that all the contaminated soil was not excavated and put into the biocell and substantial quantities of contamination in subsurface soil (approximately 5 feet below ground surface) and groundwater still remained outside the biocell area.

2.2: Remedial History

The site was first listed in the Registry of Inactive Hazardous Waste disposal sites in New York State in June 1990 as a Class "2a". The site investigation found chemical product in the ground as LNAPL which had the potential to move off the site toward a residential area. As a result of later site investigations, the site was reclassified as a Class 2 site. The Classification 2 means that the site is considered a significant threat to human health and/or environment and an action is required.

Osmose entered into consent orders with the NYSDEC to carry out bioremediation of the soils excavated during removal of the underground storage tanks and to perform a site investigation. Upon completion of the site investigation, Osmose also conducted a Feasibility Study for this site.

Bioremediation was conducted as follows:

Bioremediation

A Biocell (approximately 45x45x11 ft) was constructed in March 1990 to remediate approximately 700 yd^3 of excavated soils during removal of the decommissioned underground storage tanks. The biocell was constructed by using two layers of 30 Mil and 40 Mil HDPE liner (Fig.3). Soil was placed into the cell in lifts of approximately 18-24 inches. Perforated pipes were installed in between the lifts for introduction of nutrients and air for the micro-organisms. The biocell was closed by covering it with a liner and was paved over with asphalt. Five sampling boxes were installed to collect soil samples from the biocell to monitor its performance. Continuous air was supplied by using an air blower. Performance of the biocell was determined by the population increase of micro-organisms in the cell. This was measured by an increase in carbon dioxide concentration in the effluent gases from the cell and testing of biocell soil for the contaminants. Routine monitoring of the biocell has been conducted and reports submitted to the NYSDEC. The biocell testing data shows that for the first two years, there was a steady decrease in the concentrations of PAHs. After two years, instead of a decrease in concentration of contaminants, a sudden increase in PAHs concentration was noticed. It is suspected that the biocell liner had failed allowing the contaminants to enter into the cell. Although bioremediation is still continuing, the plans are to terminate it and remediate the soils in the cell by ozonation (See Alternative 5).

SECTION 3: CURRENT STATUS

In response to a determination that the presence of hazardous waste at the site due to creosote presents a significant threat to human health and/or the environment, Osmose has completed a Site Investigation and Feasibility Study.

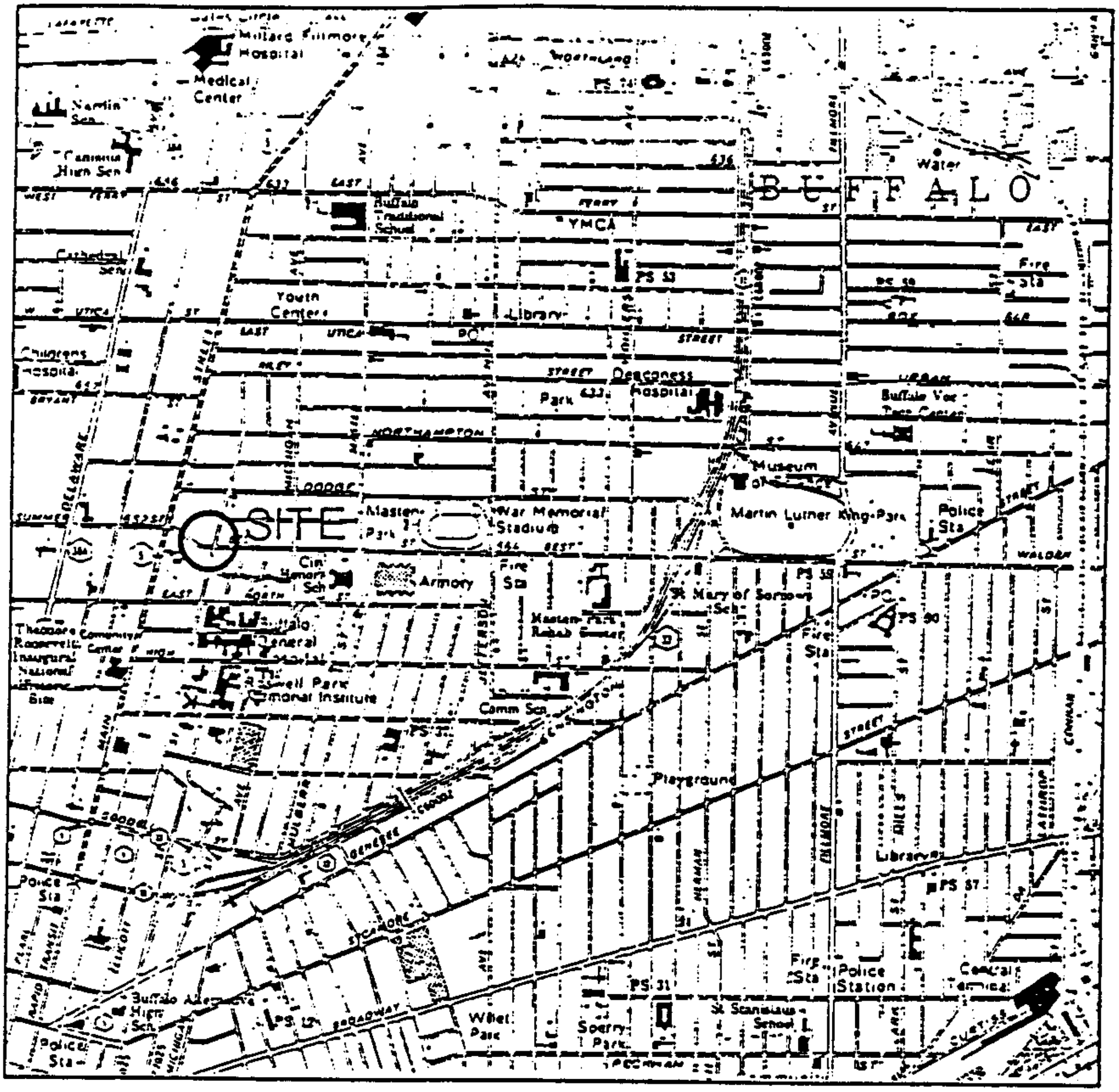
3.1: Summary of the Site Investigations

The purpose of these investigations was to define the nature and extent of any contamination resulting from previous activities at the site.
The site investigation was conducted in two phases. The first investigation report was completed in June 1991 and the supplemental investigation report in August 1993. These reports describe the field activities and findings of the investigations in detail.

The site investigations included the following activities:

- Soil gas survey to determine the plume of site contaminants.

- Installation of monitoring wells for analysis of soils and groundwater as well as physical properties of soil and hydro geologic conditions.



SOURCE: N.Y.S.D.O.T. TOPOGRAPHIC QUADRANGLE
BUFFALO NE QUADRANGLE
7.5 MINUTE SERIES
DATE: 1989

QUAD LOCATION

SCALE 1:24,000

0 2,000 4,000
SCALE FEET

N

GROUNDWATER TECHNOLOGY

1245 KINGS ROAD
SCHENECTADY, NY 12303
(518) 370-5631

DESIGNED:	SITE LOCATION MAP	
JOG		
DETAILED:	CLIENT: OSMOSE WOOD PRESERVING	DRAWING DATE: 8/13/93
DEO		
CHECKED:	LOCATION: 980 ELLICOTT STREET, BUFFALO, NEW YORK	FIGURE: 1

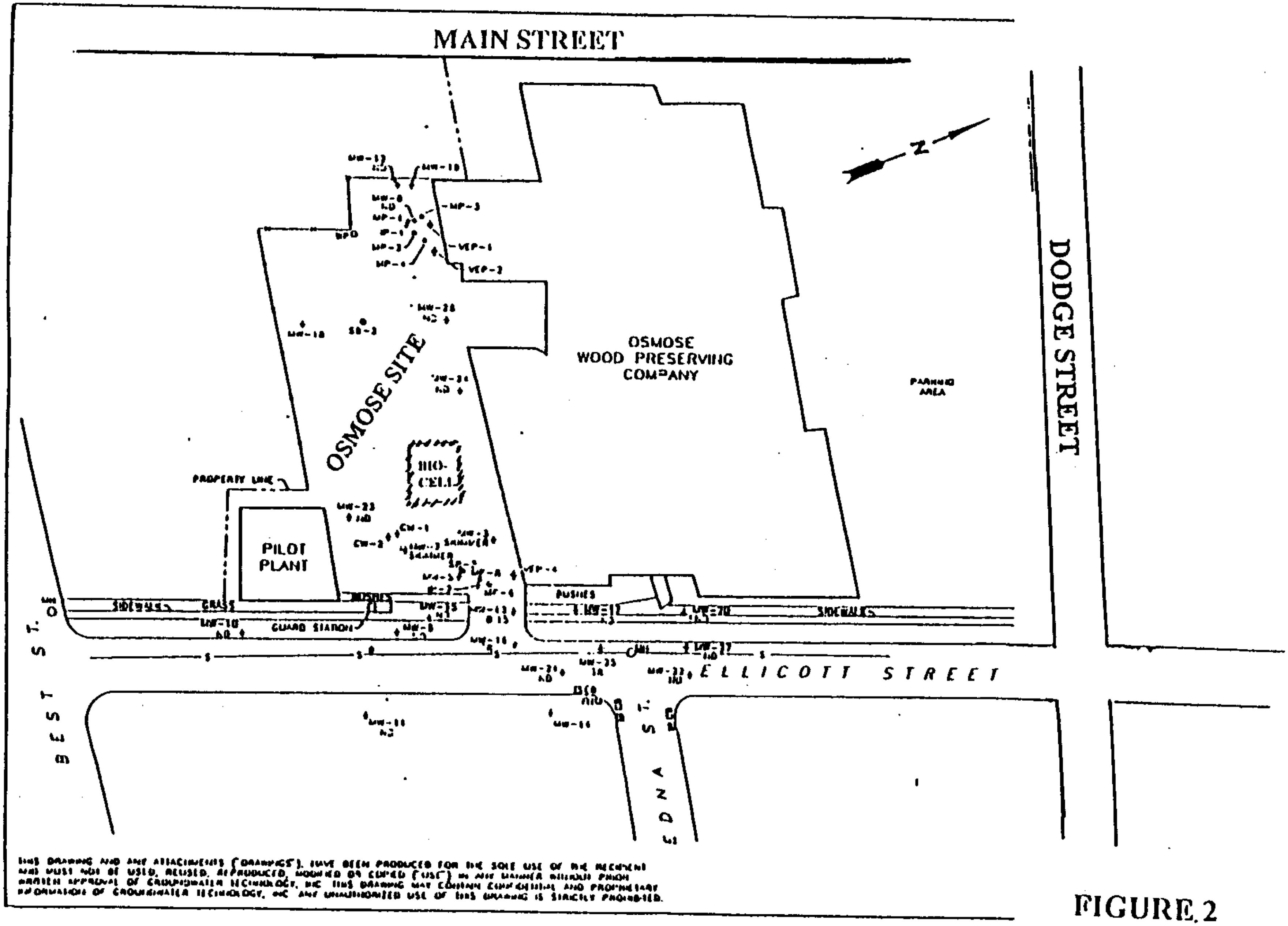

MAIN STREET
DODGE STREET
ELLICOTT STREET
OSMOSE WOOD PRESERVING COMPANY
OSMOSE SITE
PARKING AREA
BIO-CELL
PILOT PLANT
PROPERTY LINE
GUARD STATION
SIDEWALKS
BUSHES
GRASS
N

FIGURE 2

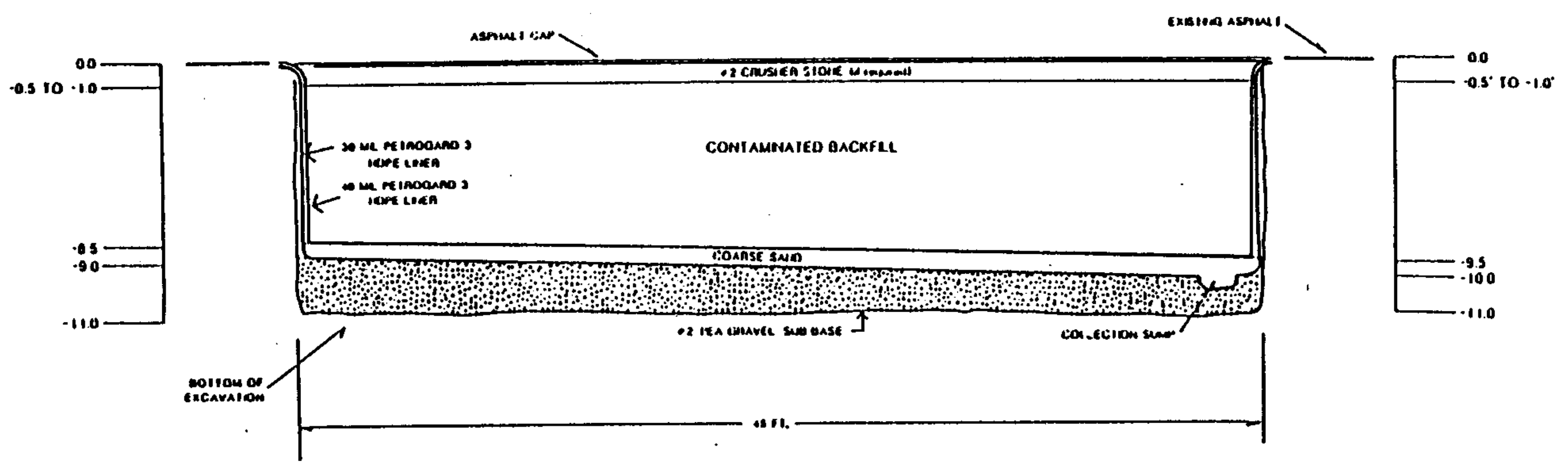


FIGURE 3

OSMOSE WOOD PRESERVING, INC.

BIOCELL CROSS SECTION

DATE: 8-29-89	SCALE: 1 IN. EQUALS
DESIGN BY: BWA	DRAWN BY: MJC

GROUNDWATER TECHNOLOGY, INC

- Sampling of municipal sewer water and sediment to determine any migration of non-aqueous phase liquids and contaminated water.

To determine which media (soil, groundwater, etc.) is contaminated at levels of concern, the analytical data obtained from the site investigations were compared to environmental Standards, Criteria, and Guidance (SCGs). Groundwater, drinking water and surface water SCGs identified for the Osmose site were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of NYS Sanitary Code. NYSDEC Technical and Administrative Guidance Memorandum (TAGM-4030) soil cleanup guidelines for the protection of groundwater, background conditions, and risk-based remediation criteria were used in developing SCGs for soil. The selected cleanup levels for soils also reflect a Human Health Risk Assessment study and the cleanup levels selected at other sites that have used bio- remediation and are referenced in an EPA document entitled "Bioremediation in the Field."

Based upon the results of the site investigations in comparison to the SCGs and potential public health and environmental exposure rates, certain areas and media of the site require remediation. The results of site investigations are summarized below. More complete information can be found in the subsurface Investigation Report dated June 1991 and Supplemental Investigation (Phase II) Report dated August 1993.

3.1.1 Nature of Contamination

As described in the Site Investigation Reports, many subsurface soil, groundwater, sewer water and sewer sediment samples were collected at the site to characterize the nature and extent of contamination.

The samples were tested for the Target Compound List (TCL) parameters, i.e. volatile organics, semivolatile organics, pesticides, polychlorinated biphenyls (PCBs), and metals. During these investigations, it was determined that the major contaminants of concern at the site were volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). The major VOCs were benzene, toluene, xylenes and ethyl benzene (BTEX) and the predominant SVOCs were polycyclic aromatic hydrocarbons (PAHs) - see Tables 1-3. Benzene and some PAHs such as benzo(a)pyrene, chrysene, etc. are known as carcinogens to animals. Discarded creosote, which is a mixture of several PAHs, is a hazardous waste and is considered toxic to humans.

3.1.2 Extent of Contamination

During investigations, it was determined that soil, and groundwater were contaminated with PAHs and BTEX. PAHs and BTEX can be grouped together and called hydrocarbons. At the Osmose site, these hydrocarbons are found adsorbed onto soil, dissolved in groundwater, or as a separate phase of light non-aqueous phase liquids (LNAPL).

It is estimated that approximately 2500 pounds (300 gallons) of the hydrocarbons are in the adsorbed phase and are within the upper 7 - 12 feet of soil. Most of adsorbed hydrocarbons are in the saturated zone of soil (i.e., below the groundwater table which is at about 7 feet below ground surface).
The majority of contamination outside the biocell area in the subsurface is in the form of floating LNAPL, which is estimated to be approximately 950 gallons. The thickness of this LNAPL varies from 0.02 feet to 0.05 feet. The LNAPL is found at an approximate depth of 8 to 10 feet below ground surface (See Fig. 4 A).

As shown in Fig. 4, the areal extent of the LNAPL extends up to the municipal sewer line. Sampling of sewer water and sediment did not indicate that LNAPL is entering the sewer pipe. By installing some monitoring wells along the sewer, it was determined that the sewer bedding was not acting as a migration pathway. Levels of PAHs and VOCs were found above the groundwater standards in several monitoring wells. Relatively low level contamination of VOCs (ND - 240 ppb) and PAHs (ND - 19 ppb) were present in the on-site deep monitoring wells. PAHs were also found well above the selected cleanup levels in the subsurface soil.

Tables 1-3 summarize the extent of contamination for the contaminants of concern in soil, shallow groundwater and compare the data with the proposed remedial action levels (SCGs) for the site. The following are the media which were investigated and a summary of the findings of the investigations.

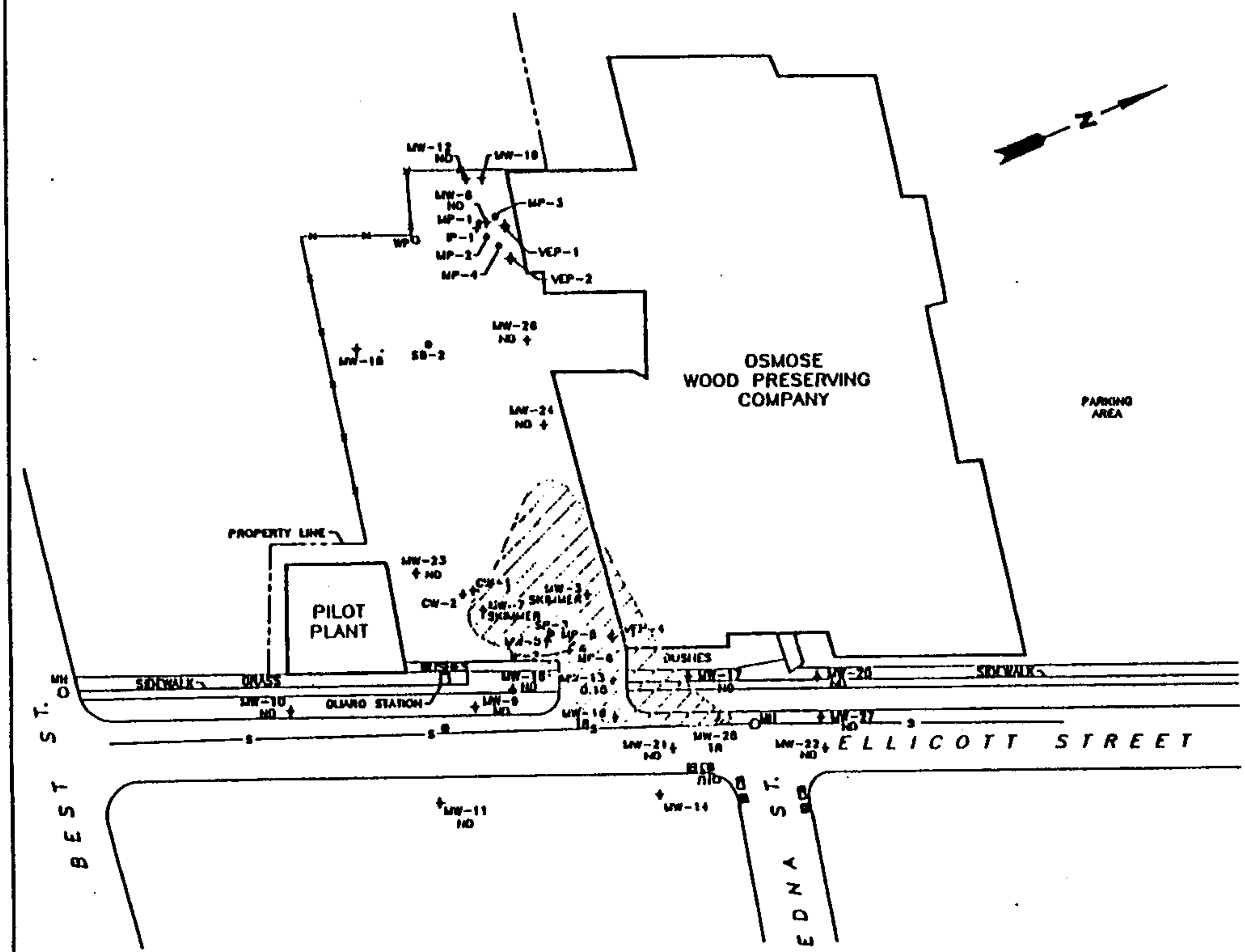
Soil

Soil gas samples were collected from 17 different locations using a probe and a pump to map the plume. Only one sample showed detectable levels of BTEX. Due to possible interferences, the source of contamination in this sample was not clear. Soil gas sampling indicated that exposure pathway by volatile compounds outside the property fence line did not exist at levels of concern. As the contaminants are in subsurface soil (approximately 7 feet below the ground surface) and are under the paved parking lot, exposure pathway to general public from this site is non- existent.

Along the eastern side of the property, lead in soil under the pavement was found up to 810 ppm. The levels of lead and zinc along the western property line were also found up to 820 ppm and 860 ppm respectively. The background levels for lead and zinc in the area are known to be as high as 693 and 1600 ppm respectively. The source of lead and zinc in soils remains unknown. The PAH levels along the southern property line and outside the fenced area varied from 123 to 179 ppm . The soils were removed in December 1994 (See Section 3.2, Pg. 8).

Both carcinogenic PAHs [such as benzo(a)pyrene and chrysene] and non-carcinogen PAHs [such as naphthalene, methylnaphthalenes, acenaphthene, anthracene, fluoranthene, fluorene and phenanthrene] were found in subsurface soil samples. The concentrations of total carcinogenic PAHs and total PAHs were found well above the selected cleanup goals of 50 ppm and 473 ppm respectively. Benzo(a)pyrene, which is considered the most carcinogenic among the PAHs was also found above the cleanup goal (Table 1). Soil samples containing LNAPL which contain PAHs well above the selected cleanup levels were not tested and therefore results are not included in Table 1. The results shown in Table 3 are more reflective of the contaminated soil conditions at the site.

It is noted that the selected cleanup levels are higher than the ones given in TAGM HWR-94-4046 and are based upon Human Health Risk Assessment study and the cleanup levels selected at other sites undergoing bioremediation which are referenced in an EPA document entitled, "Bioremediation in the Field." Selection of cleanup levels was also based upon the fact that the contaminants are either enclosed in the bio-cell or are about 6 feet below the ground surface under the paved parking lot. Metals in subsurface soil samples were within background levels.



LEGEND

- MONITORING WELL
- INJECTION POINT
- MONITORING POINT
- VAPOR EXTRACTION POINT
- SOIL BORING
- MH MANHOLE
- FH FIRE HYDRANT
- FENCE
- —S— SEWER LINE
- APPROXIMATE EXTENT OF LNAPL
- ND NONE DETECTED
- 0.15 LNAPL THICKNESS (feet)
- TR <0.01 feet
- SKIMMER THICKNESS WAS NOT MEASURED DUE TO PRESENCE OF PASSIVE LNAPL RECOVERY UNIT IN WELL

0 50 100
SCALE FEET

GAUGING DATES: 12/17/92
3/10/93

GROUNDWATER TECHNOLOGY
1246 KINGS ROAD
SCHENECTADY, N.Y. 12303
(518) 370-5631

REV. NO.:	DRAWING DATE: 8/13/93	ACAD FILE: LNAPL

AREAL EXTENT OF LNAPL

CLIENT: OSMOSE WOOD PRESERVING COMPANY			PM: BWI
LOCATION: ELLICOTT STREET BUFFALO, NEW YORK			GEO: JOC
DESIGNED: JOG	DETAILED: MET/DEO	PROJECT NO.: 01110-5307	FIGURE: 4

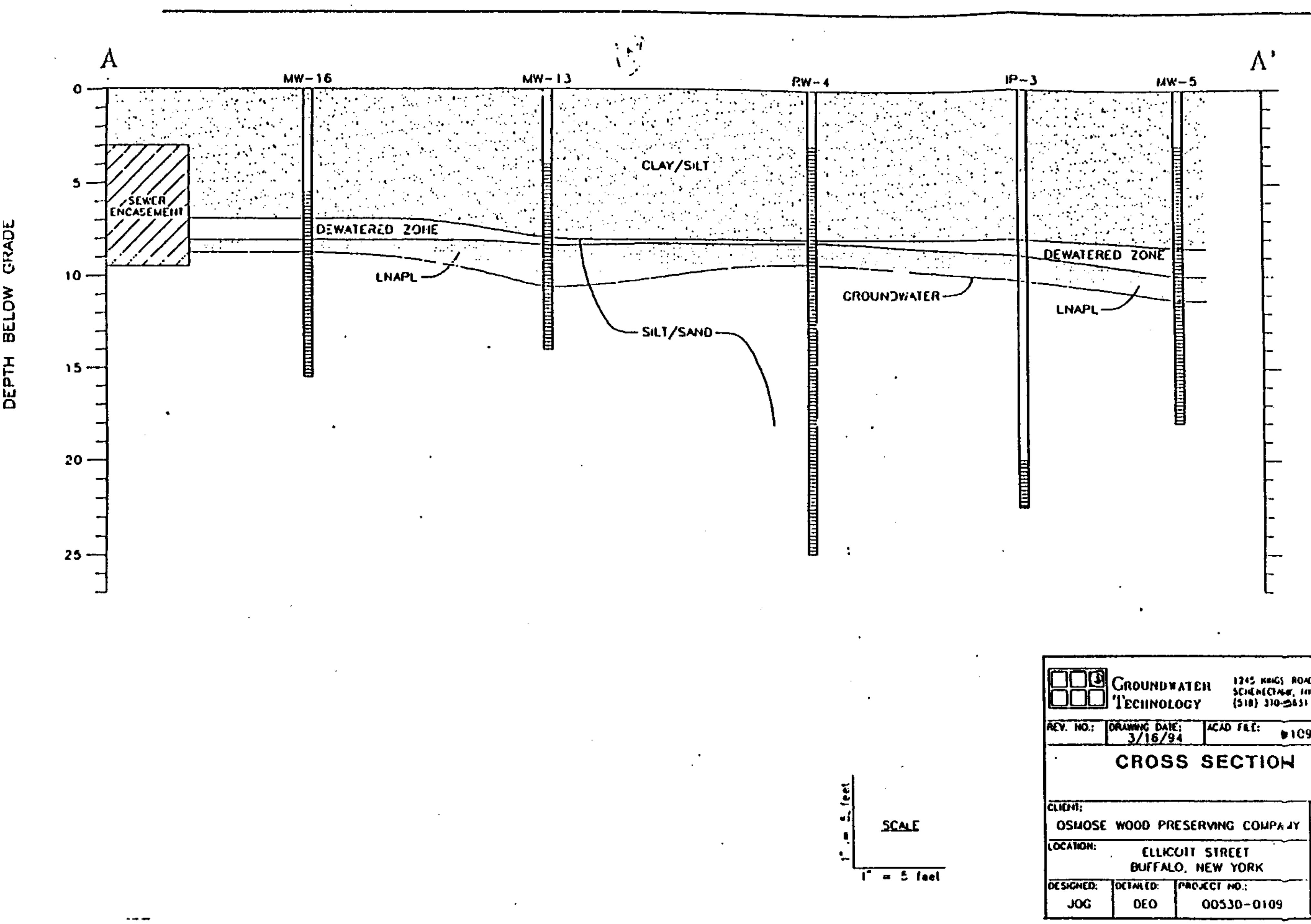


FIG. 4A: Depth of Light Non - Aqueous Phase Liquid (LNAPL) Layer

ANALYTICAL DATA FROM SITE INVESTIGATIONS

TABLE 1

Subsurface Soil (ppm)

Class	Contaminants	Concentration Range	Selected Cleanup Level (SCL)	Frequency Exceeding SCL *
VOCs	BTEX	ND-9.1	10	None
SVOCs	Total PAHs	ND-1000	473**	3 of 58
	Carcinogenic PAHs	ND-98	50	1 of 58
	Benzo(a)pyrene	ND-18	10	1 of 58

ppm- parts per million

* - Heavily contaminated subsurface soil samples containing LNAPL were not tested

**-Human Health Risk Based Cleanup Levels for PAHs in Soils = 473 ppm

TABLE 2

Shallow Groundwater (ppb)

Class	Contaminants	Conc. Range	Groundwater Std/SCGs	Frequency Exceeding SCGs
VOCs	Benzene	ND-20	0.7	4 of 13
	Toluene	ND-330	5	4 of 13
	Ethyl benzene	ND-65	5	4 of 13
	Xylenes	ND-930	5	4 of 13
	1,2-Dichlorobenzene	ND-720	4.7	3 of 13

TABLE 2 (Contd.)

Shallow Groundwater (ppb)

Class	Contaminants	Conc. Range	Groundwater Std/SCGs	Frequency Exceeding SCGs
SVOCs (PAHs)	Naphthalene	ND-1100	10	2 of 13
	Acenaphthylene	ND-260	NS	
	1-Methyl naphthalene	ND-290	NS	
	2-Methyl naphthalene	ND-1100	NS	
	Acenaphthene	ND-330	20	2 of 13
	Fluorene	ND-130	50	1 of 13
	Phenanthrene	ND-110	50	1 of 13
	Benzo(a)anthracene	ND-1.0	NS	
	Chrysene	ND-1.5	0.002	3 of 13
	Benzo(b)fluoranthene	ND-1.1	0.002	3 of 13
	Benzo(a)pyrene	ND-1.0	ND	9 of 13
	Indeno(1,2,3-cd)pyrene	ND-1.1	0.002	5 of 13

ND- None Detected
Std.- Standard
ppb- parts per billion
NS - No Standard/ Guidance value available
SCGs- Standards, Criteria, and Guidance
PAHs- Polycyclic Aromatic Hydrocarbons
VOCs- Volatile Organic Compounds
SVOCs- Semi Volatile Organic Compounds

TABLE 3

Initial PAHs levels in soil in Biocell - (July, 1989)

Polycyclic Aromatic Hydrocarbon (PAH)	Carcinogenic Classification	PAH Concentration (ppm)
Acenaphthene	NC	380
Fluorene	NC	220
Phenanthrene	NC	380
Anthracene	NC	78
Fluoranthene	NC	150
Pyrene	NC	120
Benzo(a)anthracene	C	35
Chrysene	C	35
Benzo(b)fluoranthene	C	18
Benzo(k)fluoranthene	C	13
Benzo(a)pyrene	C	14
Naphthalene	NC	590
2-Methyl naphthalene	NC	630
Acenaphthylene	NC	11
Total PAHs	NC + C	2,700

NC - Noncarcinogen C - Carcinogen

Groundwater

Thirteen shallow groundwater wells were tested for VOCs and PAHs. Among the VOCs, BTEX was detected in 4 monitoring wells MW-9, MW-15, MW-17 and MW-24 at concentrations of 560, 890, 1500, and 240 ppb respectively. 1,2 dichlorobenzene was found in wells MW-9, MW-15, and MW-17 at concentrations of 15, 440 and 720 ppb respectively. PAHs were detected in 10 out of 13 monitoring wells sampled. High levels of PAHs were found in MW-24 (1100 ppb) and MW-17 (13,000 ppb). As shown in Table 2, groundwater standards were exceeded for several VOCs and SVOCs. Among the PAHs; naphthalene and methylnaphthalenes accounted for about 95% of the total PAHs detected in shallow groundwater. The distribution of dissolved PAHs in shallow groundwater shown in Fig. 5, indicates that elevated levels of dissolved PAHs have migrated up to the Buffalo Sewer Authority (BSA) storm sewer.

Four deep wells CW-1, MW-14, MW-18, MW-19 were also installed and tested during the site investigations. BTEX was detected in CW-1 (14 ppb) and MW-18 (0.3 ppb). 1,2-dichlorobenzene was detected only in CW-1 (3.9 ppb) at concentrations below the groundwater standard.

Sewer

Water and sediment samples were collected from the sanitary sewers along the site. Test results did not show a significant increase in concentration of PAHs either in water or sediment samples when compared with up gradient samples. Therefore, it is believed that the site contaminants are not entering the sewer at this time.

Light Non-Aqueous Phase Liquid (LNAPL)

Of the total VOCs and PAHs remaining outside the biocell at the site, about 75% of the total mass is in the form of LNAPL and is found between 6 and 12 feet below the ground surface. As shown in Figure 4, some LNAPL is also suspected underneath the plant building.

Waste Materials in Biocell

Soil impacted with creosote and other contaminants which was placed in the biocell for bioremediation showed up to 115 ppm of carcinogenic PAHs and 2560 ppm of noncarcinogenic PAHs (Table 3). Among the PAHs; naphthalene and 2-Methyl naphthalene were found in highest concentrations of 590 ppm and 630 ppm respectively. Soil in biocell also showed 210 ppm of dibenzofuran.

3.2 Interim Remedial Measures:

Interim Remedial Measures (IRMs) are conducted at sites when a source of contamination or an exposure pathway can be effectively addressed before completion of the Remedial Investigation and Feasibility Study.

Surface Soil Removal:

An area of approximately 15 feet by 140 feet on an adjoining property along the southern Osmose fence line - Fig. 6, was found to be contaminated with PAHs up to 179 ppm. Osmose indicated that these PAHs

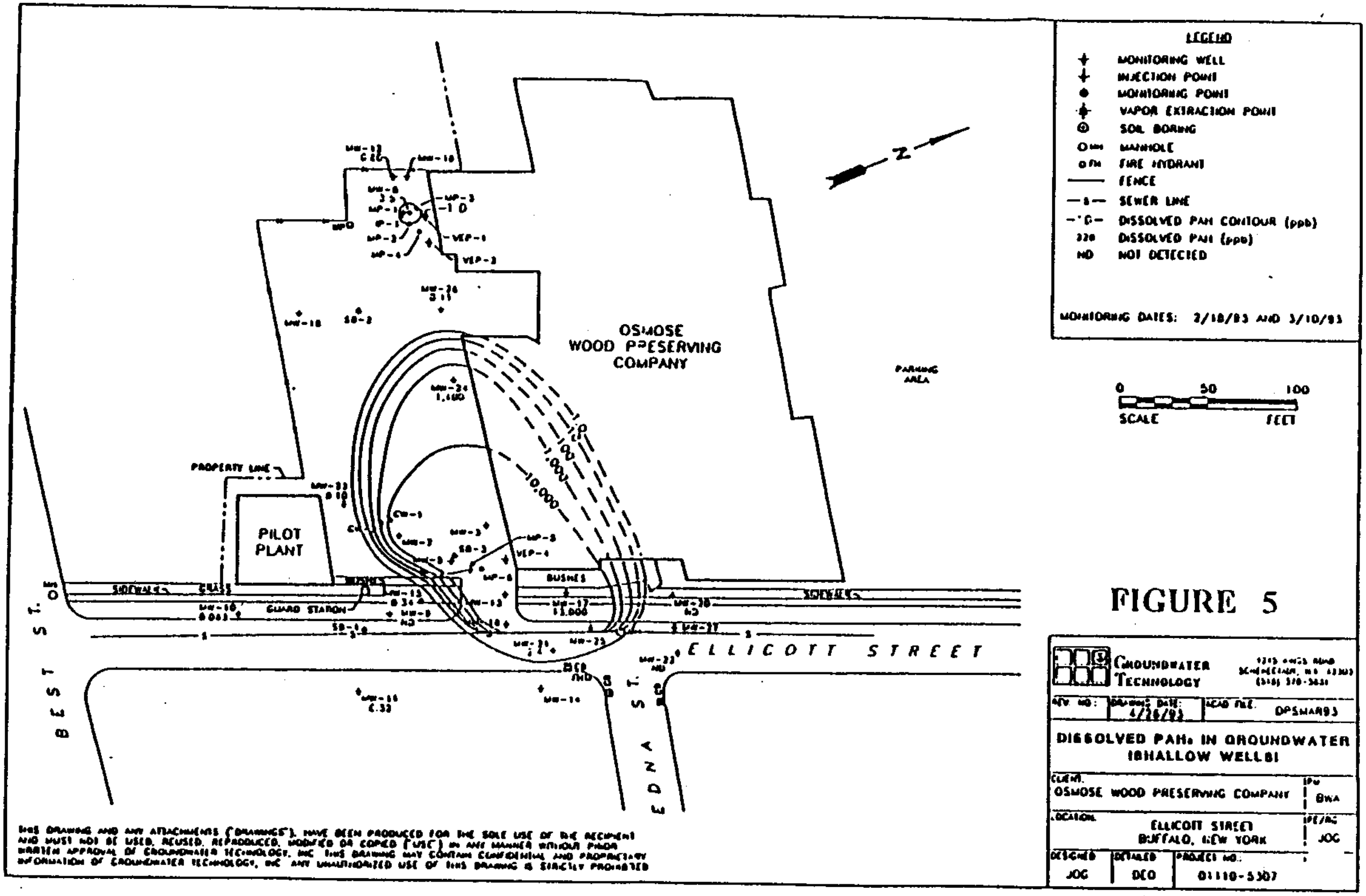
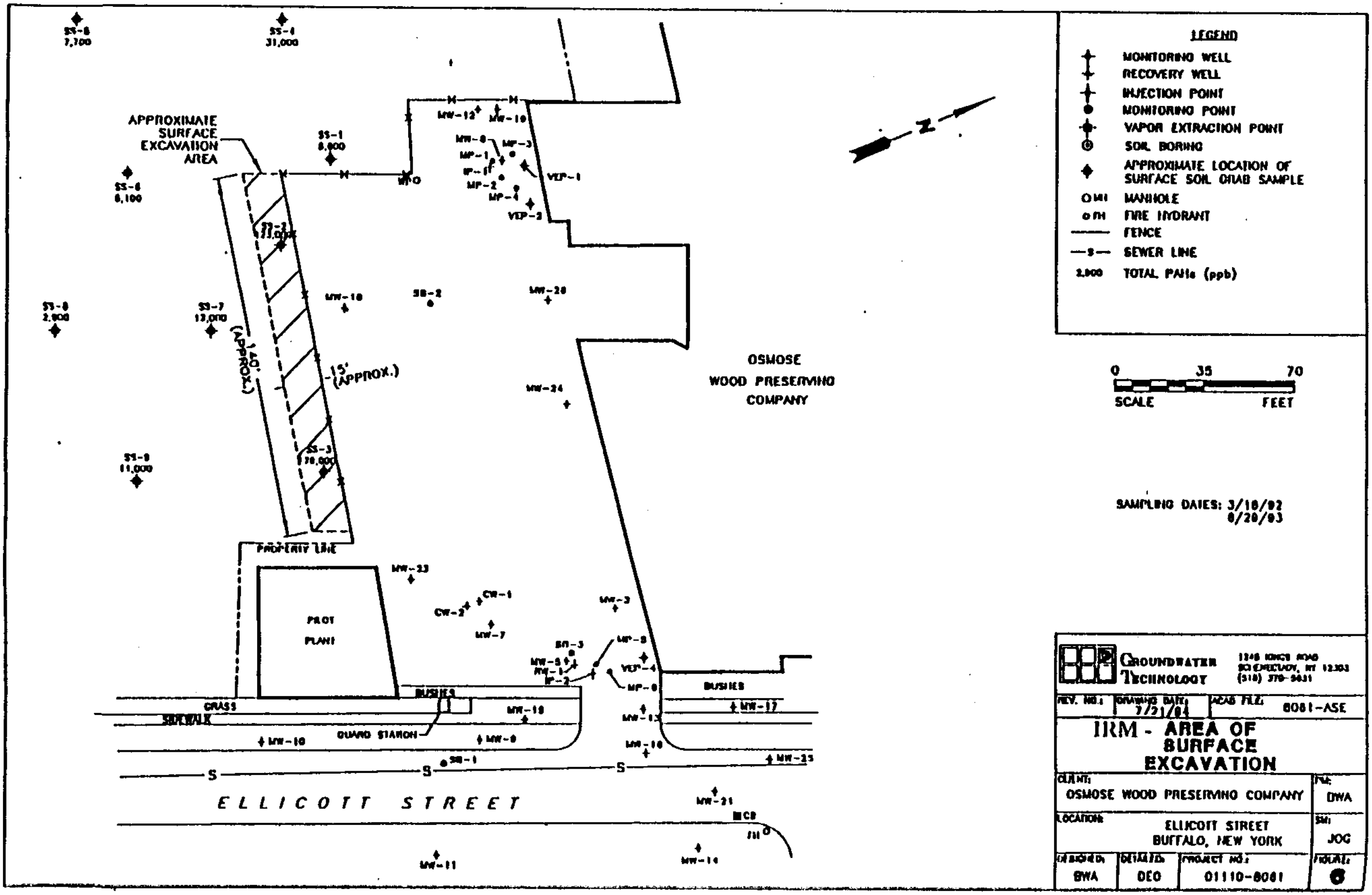

LEGEND
MONITORING WELL
INJECTION POINT
MONITORING POINT
VAPOR EXTRACTION POINT
SOIL BORING
MANHOLE
FIRE HYDRANT
FENCE
SEWER LINE
DISSOLVED PAH CONTOUR (ppb)
DISSOLVED PAH (ppb)
ND NOT DETECTED
MONITORING DATES: 2/18/93 AND 3/10/93
OSMOSE WOOD PRESERVING COMPANY
PILOT PLANT
PROPERTY LINE
GUARD STATION
SIDEWALK
GRASS
BUSHES
PARKING AREA
ELLICOTT STREET
BEST ST.
EDNA ST.
10,000
1,000
100
10
SCALE 0 50 100 FEET
GROUNDWATER TECHNOLOGY
DRAWING DATE: 4/26/93
CAD FILE: OPSMAR93
DISSOLVED PAHs IN GROUNDWATER (SHALLOW WELLS)
CLIENT: OSMOSE WOOD PRESERVING COMPANY
LOCATION: ELLICOTT STREET BUFFALO, NEW YORK
DESIGNED JOG
DETAILED DEO
PROJECT NO. 01110-5307

FIGURE 5


LEGEND
MONITORING WELL
RECOVERY WELL
INJECTION POINT
MONITORING POINT
VAPOR EXTRACTION POINT
SOIL BORING
APPROXIMATE LOCATION OF SURFACE SOIL GRAB SAMPLE
MANHOLE
FIRE HYDRANT
FENCE
SEWER LINE
2,900 TOTAL PAHs (ppb)
0 35 70
SCALE FEET
SAMPLING DATES: 3/18/92
8/20/93
N
OSMOSE WOOD PRESERVING COMPANY
APPROXIMATE SURFACE EXCAVATION AREA
140' (APPROX.)
15' (APPROX.)
SS-6 7,700
SS-4 31,000
SS-1 8,900
SS-5 6,100
SS-8 2,900
SS-7 13,000
SS-9 11,000
SS-3 70,000
PROPERTY LINE
PILOT PLANT
GRASS
SIDEWALK
BUSHES
GUARD STATION
ELLICOTT STREET
MW-12
MW-19
MW-16
MW-20
MW-24
MW-23
MW-7
MW-3
MW-10
MW-9
MW-17
MW-25
MW-21
MW-11
MW-14
VEP-1
VEP-2
VEP-4
CW-1
CW-2
SB-2
SB-1
SB-3
IP-2
MP-1
MP-2
MP-3
MP-4
MP-8
GROUNDWATER TECHNOLOGY
1348 KINGS ROAD SCHENECTADY, NY 12303 (518) 370-5631
DRAWING DATE: 7/21/94
ACAD FILE: 8081-ASE
IRM - AREA OF SURFACE EXCAVATION
CLIENT: OSMOSE WOOD PRESERVING COMPANY
PM: DWA
LOCATION: ELLICOTT STREET BUFFALO, NEW YORK
SM: JOG
DESIGNED: BWA
DETAILED: DEO
PROJECT NO.: 01110-8081
FIGURE: 6

were from non-Osmose related sources but agreed to remove contaminated soil from this area. In December, 1994, soils exceeding 100 ppm were excavated and disposed off site in a permitted facility. The excavated area was backfilled with clean fill.

__Light Non-aqueous Phase Liquid (LNAPL) Recovery:__

Since approximately 75% of the hydrocarbon contaminants (PAHs and BTEX, etc.) are present in the LNAPL form, its recovery was considered essential. The recovery of LNAPL started during early stages of the site investigations. Wells installed during the ozone pilot test in 1993 and some additional monitoring wells were used as recovery wells. The water containing LNAPL from those recovery wells is pumped into a holding tank, where it separates into two layers, i.e. LNAPL and water layer containing dissolved contaminants. The LNAPL layer is separated and disposed off site at a permitted facility while the water layer is passed through activated carbon units to remove dissolved contaminants and the treated water is discharged to a Buffalo Sewer Authority (BSA) sewer.

The LNAPL recovery system was upgraded in March 1994 to better contain the contaminated groundwater and enhance its recovery. Three additional recovery wells were installed during this phase of the upgrade. The effectiveness of the recovery wells to maintain the contaminated water within the site is shown in Fig.7. Presently, LNAPL is pumped out of 6 recovery wells by vacuum enhanced recovery system and is also manually retrieved from three monitoring wells; MW-13, MW-16 and MW-17. It is estimated that to date, approximately 250 gallons of LNAPL have been recovered.

3.3 Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the health risks can be found in Section 6 of the June 1991 Subsurface Investigation Report.

An exposure pathway is how an individual may come in contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

The contamination at Osmose site is due to the leakage of underground storage tanks and the contaminated area is paved over with asphalt, therefore, surficial soils are not considered an exposure pathway. Completed pathways known to or that may exist at the site include:

- Ingestion of contaminated subsurface soil or groundwater by workers doing any excavation in the contaminated area. (Note: Groundwater is not being used as a source of potable water; all local residents are served by public water).
- Dermal contact with subsurface soil or groundwater by excavation workers in the contaminated areas.
- Potential to impact nearby residents via uncontrolled offsite migration of contaminants, if the groundwater plume is not controlled.
- Inhalation of VOCs by excavation workers.

3.4 Summary of Environmental Exposure Pathways:

This section summarizes the types of environmental exposures which may be presented by the site.

The site does not directly impact any surface water or wildlife. However, if migration of LNAPL and the contaminants in soil and groundwater from the site is not controlled, it may enter the nearby sewer.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers. The Potentially Responsible Party (PRP) for the site is Osmose Wood Preserving Company.

The NYSDEC and Osmose Wood Preserving Inc. entered into Consent Orders on dates shown in the following table to carry out the IRMs, Site Investigation, Feasibility Study and upgrade of the LNAPL System. Upon issuance of the Record of Decision, the NYSDEC will approach the PRP to implement the selected remedy under a Remedial Design/ Remedial Action (RD/RA) Consent Order.

Date	Index	Subject
2/20/90	B9-0314-90-01	Bioremediation & Site Investigation
4/20/95	B9-0314-90-01	IRM & Feasibility Study

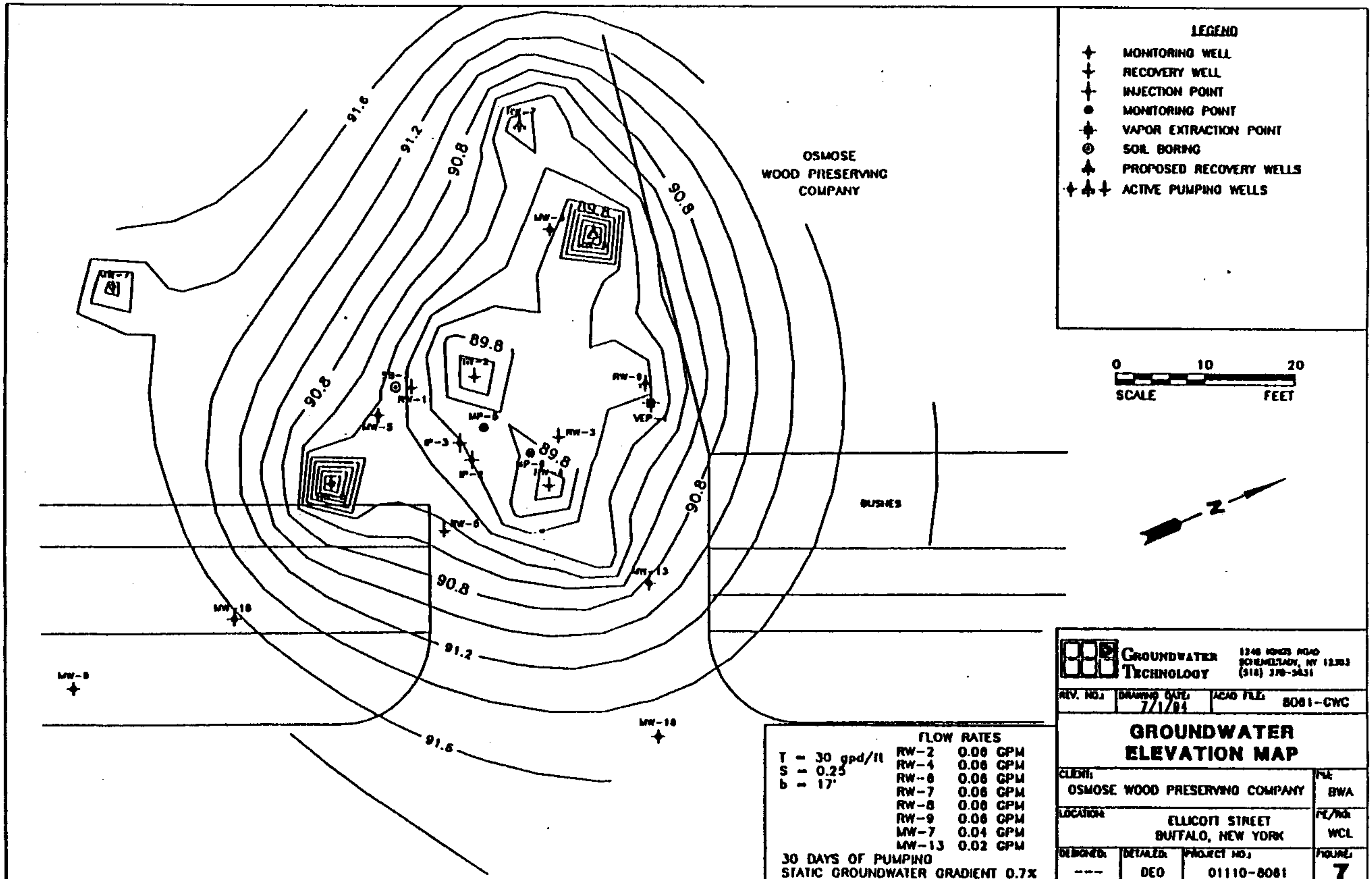
SECTION 5: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR 375-1.10. These goals are established under the overall goal of protecting human health and the environment and meeting all Standards, Criteria, and Guidance (SCGs).

At a minimum, the remedy selected should eliminate or mitigate all significant threats to public health and the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The goals selected for this site are:

- Reduce the contamination present within the soils/waste on site to meet the selected cleanup levels (Cleanup levels are given in Tables 1 and 3).
- Eliminate the potential for direct human or animal contact with the contaminated soils, LNAPL and groundwater on-site.
- Mitigate the impacts of contaminated groundwater and LNAPL to the environment.
- Prevent, to the extent practicable, migration of contaminants from the site.


LEGEND
MONITORING WELL
RECOVERY WELL
INJECTION POINT
MONITORING POINT
VAPOR EXTRACTION POINT
SOIL BORING
PROPOSED RECOVERY WELLS
ACTIVE PUMPING WELLS
OSMOSE
WOOD PRESERVING
COMPANY
BUSHES
0 10 20
SCALE FEET
N
91.6
91.2
90.8
89.8
MW-8
RW-2
MP-5
RW-1
MW-5
IP-3
IP-2
RW-3
RW-4
RW-9
VEP-1
MW-6
MW-13
MW-10
MW-9
FLOW RATES
T = 30 gpd/ft
S = 0.25
b = 17'
RW-2 0.06 GPM
RW-4 0.06 GPM
RW-6 0.06 GPM
RW-7 0.06 GPM
RW-8 0.06 GPM
RW-9 0.06 GPM
MW-7 0.04 GPM
MW-13 0.02 GPM
30 DAYS OF PUMPING
STATIC GROUNDWATER GRADIENT 0.7%
GROUNDWATER TECHNOLOGY
1240 KINGS ROAD
SCHENECTADY, NY 12303
(518) 370-5631
REV. NO.:
DRAWING DATE: 7/1/94
ACAD FILE: 8061-CWC
GROUNDWATER
ELEVATION MAP
CLIENT: OSMOSE WOOD PRESERVING COMPANY
FILE: BWA
LOCATION: ELLICOTT STREET
BUFFALO, NEW YORK
PE/RG: WCL
DESIGNED: ---
DETAILED: DEO
PROJECT NO.: 01110-8061
FIGURE: 7

- Provide for attainment of SCGs for groundwater quality at the limits of the area of concern (i.e. at Compliance Wells), to the extent practicable.

SECTION 6: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy should be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Osmose site were identified, screened and evaluated in a Feasibility Study. This evaluation is presented in the report entitled Feasibility Study - Osmose Wood Preserving, Inc., dated December 22, 1995.

Seven alternatives were initially screened in the Feasibility report. Among those, alternatives 2 and 4 were not considered for detailed evaluation. Alternative 2 would contain the contaminants on-site or monitor the migration of contaminants from the source area.

Alternative 2 would not be protective of human health and the environment because the volume and toxicity of contaminants would not be reduced. Alternative 4 would remove LNAPL and dispose of it off-site. The contaminated soil would be excavated and treated on-site. As the site is located in a residential area, the on-site treatment of soil would be difficult to implement.

6.1: Description of Alternatives

The potential remedies are intended to address the contamination at the site.

A summary of the detailed analysis follows. As used in the following text, the time to construct reflects only the time required to construct the remedy, and does not include the time required to design the remedy, procure contracts for design and construction or to negotiate with responsible parties for implementation of the remedy. Cost estimates are based upon an interest rate of 6%.

Alternative 1: No Action; Monitoring

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative requires continued groundwater monitoring but no remediation. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Present Worth:	$ 413,000
Capital Cost:	$ 0
Annual O&M:	$ 30,000
Time to Construct: N/A	

Note: The costs for alternative 1 are based upon the assumption that the site would be monitored only for the next 30 years.

Alternative 3: LNAPL & Soil Removal; Soil Incineration; Monitoring

In Alternative 3, LNAPL would be extracted by vacuum enhanced pumping and incinerated at some off-site facility. Any water separated from LNAPL would be treated by passing through granular activated carbon units and discharged to a Buffalo Sewer Authority (BSA) sewer. The contaminated soil from inside and outside of the biocell would be excavated and incinerated at some off-site facility. The contaminated groundwater would not be treated or removed, but would be monitored over long periods of time. With the extraction of LNAPL, an area of influence to capture contaminated groundwater would be created. This would greatly reduce further migration of the plume of LNAPL and contaminated groundwater. Following removal of LNAPL and soil, the site would be paved. A deed restriction would remain on the property.

Present Worth:	$ 2,194,415
Capital Cost:	$ 1,841,347
Annual O&M:	$ 26,000
Time to Construct:	Less than six months

Alternative 5: LNAPL Removal, In-situ Ozone Treatment & Monitoring

In Alternative 5, LNAPL (which primarily consists of components of fuel oil and creosote) would be removed by vacuum enhanced pumping. Any water extracted along with LNAPL would be separated from it, passed through carbon adsorbing units, and discharged to the BSA sewer. The collected LNAPL would be sent off-site for incineration. Upon completion of recovery of LNAPL which is expected to be accomplished within 4-5 years, ozone would be injected into the saturated soil to destroy the contaminants by oxidation in soils and groundwater. Any unreacted ozone would be recovered via soil vapor extraction. Ozone gas monitoring would be conducted during this phase of the project to ensure safety of workers and the community. Ozone treatment or ozonation would continue until cleanup levels for soil are met and remaining levels of contaminants in groundwater wells are shown to have no adverse impact on the sanitary sewer and the contaminants plume is limited to property owned by Osmose. Upon completion of LNAPL removal, soils within biocell would also undergo ozonation. A conceptual layout of ozone injection system is shown in Fig.8. Ozone treatment is expected to last for about 2 years.

The effectiveness of ozone technology was evaluated at the site during a one month pilot test in 1993. Results of this pilot test showed that more than 90% reduction was achieved in the concentration of contaminants in the area where there was no LNAPL. The area having LNAPL did not show any significant decrease in levels of contaminants. Thus it was concluded from the pilot test data that in order for ozonation to be effective, LNAPL must be removed before start of ozonation.

The selected compliance wells (MW-11, MW-14, MW-28) and the BSA sewer on Ellicott Street would be monitored on a long term basis for any off-site migration of contamination. The pavement covering of the site would be maintained. Upon completion of ozone treatment, groundwater contamination will be evaluated. If at that time, groundwater contamination exists at levels which is detrimental to human health or the environment, measures will be taken to reduce groundwater contamination (e.g., pump-and-treat). Osmose would place a deed restriction to prevent exposures to contaminated subsurface soils and to prevent any residential development on the contaminated portion of the property.

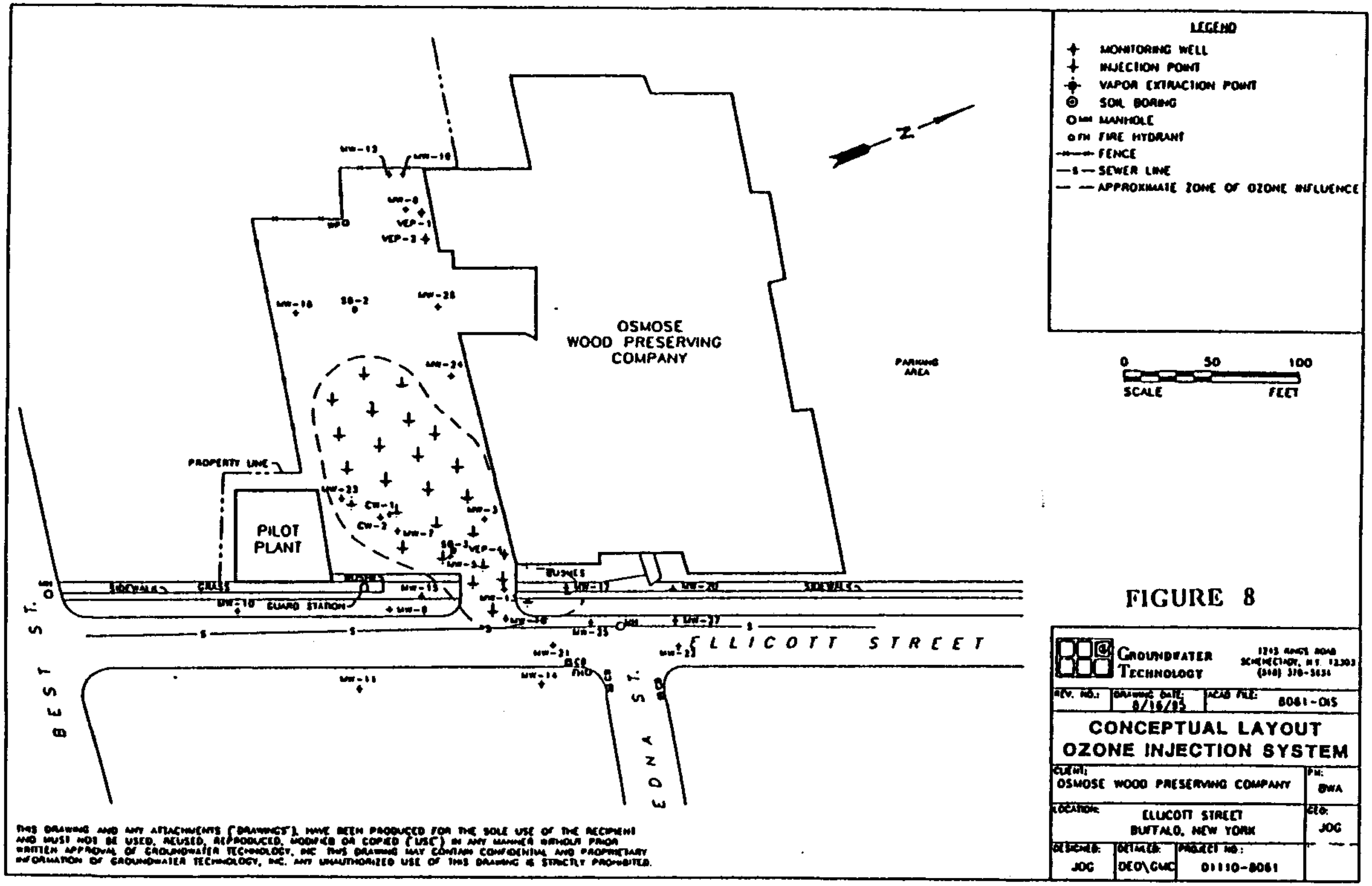

LEGEND
MONITORING WELL
INJECTION POINT
VAPOR EXTRACTION POINT
SOIL BORING
MANHOLE
FIRE HYDRANT
FENCE
SEWER LINE
APPROXIMATE ZONE OF OZONE INFLUENCE
N
OSMOSE WOOD PRESERVING COMPANY
PILOT PLANT
PROPERTY LINE
GUARD STATION
SIDEWALK
GRASS
BUSHES
PARKING AREA
ELLICOTT STREET
BEST ST.
EDNA ST.
0 50 100
SCALE FEET
GROUNDWATER TECHNOLOGY
DRAWING DATE: 8/16/95
ACAD FILE: 8081-OIS
CONCEPTUAL LAYOUT
OZONE INJECTION SYSTEM
CLIENT: OSMOSE WOOD PRESERVING COMPANY
PM: BWA
LOCATION: ELLICOTT STREET BUFFALO, NEW YORK
GEO: JOG
DESIGNED: JOG
DETAILED: DEO\GMC
PROJECT NO.: 01110-8081
THIS DRAWING AND ANY ATTACHMENTS ("DRAWINGS"), HAVE BEEN PRODUCED FOR THE SOLE USE OF THE RECIPIENT AND MUST NOT BE USED, REUSED, REPRODUCED, MODIFIED OR COPIED ("USE") IN ANY MANNER WITHOUT PRIOR WRITTEN APPROVAL OF GROUNDWATER TECHNOLOGY, INC. THIS DRAWING MAY CONTAIN CONFIDENTIAL AND PROPRIETARY INFORMATION OF GROUNDWATER TECHNOLOGY, INC. ANY UNAUTHORIZED USE OF THIS DRAWING IS STRICTLY PROHIBITED.

FIGURE 8

Present Worth:	$ 650,000
Capital Cost:	$ 276,500
Annual O&M:	$ 44,560
Time to Construct:	Less than six months

Alternative 6: <u>LNAPL Removal, In Situ Soil Biological Treatment & Monitoring</u>

In Alternative 6, LNAPL would be recovered and incinerated as in Alternative 5. The contaminated soils would undergo in-situ bioremediation. The nutrients and air for the biological treatment would be injected into the contaminated area. Bioremediation would continue until cleanup levels for soils are met. A deed restriction would be placed and the site area would be paved.

Present Worth:	$ 652,600
Capital Cost:	$ 160,670
Annual O&M:	$ 50,670
Time to Construct:	Less than six months

Alternative 7: <u>LNAPL Removal, In Situ Thermal Treatment of Soil & Monitoring</u>

In this Alternative, LNAPL would be extracted as in Alternative 5. The recovered LNAPL would be incinerated at an off-site facility. Groundwater extracted along with LNAPL would be treated and discharged to Buffalo Sewer Authority sewer. Upon completion of LNAPL recovery, groundwater quality would be monitored. Contaminated soils in and outside the biocell would be treated in situ by injection of steam. The contaminant laden vapor would be recovered, condensed, and disposed off-site.

Present Worth:	$ 635,000
Capital Cost:	$ 260,000
O&M Cost:	$ 40,350
Time to Construct:	Less than six months

6.2 <u>Evaluation of Remedial Alternatives</u>

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6NYCRR Part 375). For each of the criteria, a brief description is provided followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is contained in the Feasibility Study.

The first two evaluation criteria are termed threshold criteria and must be satisfied in order for an alternative to be considered for selection.

1. <u>Compliance with New York State Standards, Criteria, and Guidance (SCGs)</u>.

Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards and guidance.

The Feasibility Study report lists the SCGs for this site. The most significant of the SCGs include the following:

Soil

- TAGM HWR-94-4046 Guidance regarding soil cleanup levels.
- 6 NYCRR Part 371 Identification and Listing of Hazardous Wastes.
- 6 NYCRR Part 372 Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities.
- 6 NYCRR Part 376 Land Disposal Regulation.

Groundwater

- NYSDEC Ambient Water Quality Standards and Guidance Values, TOGS 1.1.1
- 6 NYCRR Part 703 Water Quality Regulations
- 6 NYCRR Parts 750-758 State Pollution Discharge Elimination System (SPDES).
- Municipal Sewer Permit

Air

- 6 NYCRR Part 212 NYSDEC Air Guide 1 (Draft).

Discussion

Alternative 1, No Action, would not meet SCGs for the site. No Action would be taken to alter current conditions at the site. Soils and groundwater which are contaminated to levels above SCGs would not be addressed. Alternative 3 would meet SCGs for soil as contaminated soil above selected cleanup levels would be excavated for off site incineration. Upon removal of the source of contaminants (LNAPL and soil), it is believed that groundwater SCGs for the dissolved contaminants in groundwater would be achieved over a very long period of time by natural attenuation and degradation.

Although alternatives 5,6 and 7 would not be in compliance with guidance from TAGM HWR-94-4046, they would achieve site specific cleanup levels. The selected site specific cleanup levels are based upon a Health Risk Assessment study and cleanup levels selected at other sites undergoing bio-remediation. Selection of cleanup levels were also based upon the fact that the contaminants are either enclosed in the biocell or are about 6 feet below the ground surface under the paved parking lot. The soil cleanup would be achieved much faster in Alternative 5 as compared to alternatives 6 and 7. Cleanup levels would also be met for LNAPL by off site incineration at a permitted facility and groundwater collected during recovery of LNAPL by treatment prior to discharge to BSA sewer to comply with BSA permit. Air discharged from the recovery pumps to atmosphere would also comply with Air Quality regulations as the contaminants from air would be removed by passing through carbon canisters.
It is expected that groundwater SCGs would be achieved over a long period of time by natural attenuation and degradation.

2. <u>Protection of Human Health and the Environment</u>.

This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

Alternative 1 would not be protective of human health or the environment. It would contain no actions to address LNAPL, contaminated soil and groundwater at the site, therefore, all current risks would remain.

Alternatives 3,5, and 6 would be protective of human health and the environment as LNAPL would be removed and permanently destroyed. Because of low volatility of higher molecular weight PAHs, Alternative 7 may not remove all the PAHs. Therefore Alternative 7 may not be fully protective of human health and the environment. With removal of LNAPL, a threat of off-site migration of LNAPL and groundwater contamination would be greatly reduced. In Alternative 3, contaminated soil would be incinerated at some off site facility, while it would undergo in-situ treatment in Alternatives 5, 6, and 7. The contaminant reduction obtained through implementation of any of these alternatives would eliminate adverse impacts on human health and the environment. After removal of LNAPL and treatment of soil, the levels of contaminants in groundwater may remain elevated within the property area for some time. This would present of health concern to workers doing any excavation in that area. The area is served by municipal water and the contaminants in groundwater are not considered of any concern to the area residents.

Future exposure to residual contaminants in soils would be eliminated through a deed restriction in Alternatives 3,5,6 and 7.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. <u>Short-term Impacts & Effectiveness.</u>

The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternative 1- No Action- would not produce any short term impacts to the workers and community. The vacuum enhanced LNAPL removal system is already installed and operational and would not have any short term adverse impacts for Alternatives 3,5, 6 and 7.

Excavation and off-site transportation of contaminated soil in Alternative 3 would have short term impacts which would be mitigated through engineering controls, personnel protective equipment and trained personnel. Significant short term risk to workers exists during implementation of Alternatives 5, 6 and 7, which require construction. The community and the workers would experience minor noise disruptions. All work would be performed according to a site specific Health and Safety Plan to protect the workers and nearby community.

4. Long-term Effectiveness and Permanence.

This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 1, No Action would not provide any reduction of environmental risk or long-term control of human health risk. Removal and incineration of LNAPL and contaminated soil in Alternative 3 would permanently remove the source of contaminants. Contaminated groundwater would not be treated at all and would require long term monitoring.

Removal of LNAPL and degradation of contaminants in soil and groundwater by ozone oxidation in Alternative 5 would be effective and permanent. Ozonation would break down the complex PAHs into simpler and non-toxic compounds. The remaining contaminants in groundwater would require long term monitoring.

LNAPL removal and biological degradation of contaminants in soil in Alternative 6 would also be effective and a permanent remedy. Biodegradation is much slower and less effective for degrading higher molecular weight PAHs as compared to chemical oxidation by ozone.

Enhanced removal of LNAPL and contaminants adsorbed to soil by steam in Alternative 7 may not be effective and permanent because of the uncertainty of complete steam volatilization of high molecular weight PAHs. It would also take much longer to meet remedial action objectives (RAOs) as compared to Alternative 5.

5. Reduction of Toxicity, Mobility or Volume

Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternative 1 - No Action -would not provide reduction in toxicity, mobility or volume of contaminants.

Groundwater control during LNAPL removal would significantly reduce the mobility of the source and dissolved contaminants in Alternatives 3,4,5,6 and 7. The volume of LNAPL and contaminated soil would be greatly reduced during their removal in Alternative 3.

In Alternative 5, the contaminants would be broken down by ozone oxidation thereby reducing volume and toxicity of the contaminants in soil and groundwater. Similarly, the volume and toxicity of contaminants would be reduced by bioremediation in Alternative 6.

In Alternative 7, volume of contaminants in soil and groundwater would be reduced by steam volatilization and removal from the site. Off site incineration of recovered LNAPL and materials collected during steam volatilization or thermal recovery would permanently reduce toxicity of the contaminants. Alternatives 6 and 7 would also take longer time than Alternative 5 to reduce volume and/or toxicity of the contaminants of concern.

6. Implementability

The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

Alternative 1- No Action- would not require any effort to implement.

One element of Alternatives 3,5,6 and 7 is LNAPL source removal. This is already in place and operational.

Excavation of soil in Alternative 3 would require rerouting several utilities and supporting the building foundation which has a rubble stone foundation. This would also be most difficult to implement.

Installation of ozone injection and extraction pipes in Alternative 5 requires normal construction and is relatively easy to implement. The materials of some utility lines which are incompatible with ozone would have to be rerouted. The ozone treatment system would require considerable maintenance to ensure performance of the system.

Alternative 6 and 7 would be easy to implement as construction for these alternatives would be easy and utilities would not require rerouting.

7. Cost

Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost

Alternative	Present Worth	Capital	O & M
No Action	$ 413,000	$ 0	$ 30,000
3	2,194,415	1,841,347	26,000
5	650,000	276,500	44,560
6	652,600	160,670	50,670
7	635,000	260,000	40,350

O & M - Operation and Maintenance

effectiveness can be used as the basis for the final decision. The costs for each alternative are given in the above Table:

This final criterion is considered a modifying criterion and is considered after evaluating those above. It is focused upon after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance

Concerns of the community regarding the Site Investigation and FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary" included as Appendix A presents the public comments received and Department's response to the concerns raised.

SECTION 7: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the Site Investigation and FS, and the evaluation presented in Section 6, the NYSDEC is selecting Alternative 5 as the remedy for this site.

This selection is based upon the conclusion that remedy selected in Alternative 5 will meet all the remedial goals for this site and will best achieve the threshold and balancing criteria described in Section 6.2.

Alternative 1 would not be protective of human health and the environment. Alternatives 3,5,6, and 7 were protective of human health and environment and met compliance with SCGs. Alternative 3 is not preferred because it is the most costly and most difficult to implement. Because of low volatility of heavier components of creosote or higher molecular weight PAHs, it is believed that Thermal Treatment in Alternative 7 would be ineffective. Therefore Alternative 7 was eliminated because it may not meet the RAOs. Alternative 5 was selected over Alternative 6 because Alternative 5 will complete remediation in a shorter time period. The success of ozonation in Alternative 5 is dependent upon removal of LNAPL. The currently installed LNAPL recovery system appears to be effective

The estimated present worth cost to carry out the remedy is $650,000. The cost to construct the remedy is estimated to be $276,500 and the estimated average annual operation and maintenance cost is $44,560.

The elements of the selected remedy (i.e. Alternative 5) are as follows:

- A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Uncertainties identified during the Site Investigation and the FS will be resolved.
- Recovery of light Non-Aqueous Phase Liquid (LNAPL).
- Incineration of recovered LNAPL at an off-site facility.
- Ozone treatment of soils.
- Appropriate air monitoring for nuisance odour emissions which may be encountered from the carbon treatment system.
- Groundwater monitoring for compliance.
- Monitoring of sanitary sewer and sewer bedding monitoring well.

Since the remedy results in untreated hazardous waste remaining at the site, a long-term monitoring program will be instituted. This program will allow the effectiveness of the selected remedy to be monitored and will be a component of the operation and maintenance for the site. A deed restriction will prevent contact with subsurface soils and prevent any residential development of the area left with residual contamination.

SECTION 8: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation (CP) activities were undertaken in an effort to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- A repository for documents pertaining to the site was established at the public library - North Jefferson Branch, 332 E. Utica Street, Buffalo, NY 14208.

- A site mailing list was established which included nearby property owners, local elected officials, local media, and other interested parties.

- Fact sheets were mailed to persons on the contact list on June 27, 1996, and July 17, 1996 to announce the public meetings. The first public meeting was held at the New York State Department of Environmental Conservation Region 9 office, Buffalo, New York on July 9, 1996. Two public meetings were held on August 1, 1996 at the Calvary C.M.E. Church, 1007 Ellicott Street, Buffalo, New York to describe the Proposed Remedial Action Plan. The public comment period extended from June 27, 1996 to August 19, 1996. Comments received regarding the Proposed Remedial Action Plan have been addressed and are documented in the Responsiveness Summary (Appendix A).

- As a result of comments at the August 1, 1996 public meeting, a Citizens Advisory Committee (CAC) was formed. The draft responsiveness summary was discussed at a CAC meeting on October 16, 1996.The comments and concerns from this meeting were incorporated into the responsiveness summary.

APPENDIX A

RESPONSIVENESS SUMMARY

OSMOSE WOOD PRESERVING, INC.

Buffalo, Erie County
Site No. 915143

This responsiveness summary contains questions and comments received by the New York State Department of Environmental Conservation (NYSDEC) regarding the Proposed Remedial Action Plan (PRAP) for the subject site. Public meetings were held on July 9, 1996 and August 1, 1996 to present the results of the site investigations and Feasibility Study and to describe the PRAP. The public comment period on the PRAP lasted from June 27, 1996 to August 19, 1996. The information below summarizes a description of the selected remedy, questions received from the public, and the Department's responses to the questions.

Description of the Selected Remedy

The selected remedy (Alternative 5 in the Feasibility Study dated December, 1995) is the same as was proposed in the PRAP. The major elements of the selected remedy include:

1. A remedial design program to provide details necessary for the construction, operation and maintenance, and monitoring of the remedial program.
2. Recovery of Light Non-Aqueous Phase Liquid (LNAPL)
3. Incineration of recovered LNAPL at an off-site facility.
4. Ozone treatment of soils.
5. Groundwater monitoring for compliance.
6. Monitoring of sanitary sewer and sewer bedding monitoring well.
7. Deed Restriction

Responses to Public Comments and Concerns:

The questions raised during the public meetings and the responses are given below. No written comments from the public were received during the comment period.

A: NYSDEC RESPONSES:

CITIZEN PARTICIPATION

Q. **Did Councilman Pitts know about this problem?**
A. Fact Sheets or notifications describing the problem and progress of the project were sent out to nearby residents, elected officials, news media and other interested citizens in January 1990, August 1995, June 1996, and July 1996. In January 1990, Mr. David Collins, who was the councilman at that time, was notified of the environmental problem at the site. The area Councilman and the City Clerk of City of Buffalo have been on all the mailing lists.

Q. **When was the leak of oily materials first discovered? How long had the tanks been leaking? What happened to the leaking tanks? When was the public made aware of the problem?**
A. The oily material was first discovered leaking in August 1989. It is not known when the tanks started leaking. The leaking tanks were emptied, excavated, and were properly disposed off-site. The public was informed of this environmental problem by notifications and fact sheets. The first Fact Sheet was sent out in January 1990.

Q. **Why were more residents not notified of the public meeting?**
A. For the July 9, 1996 public meeting, over 225 notices were sent out to the nearby residents, elected officials including the City officials, news media and some other interested citizens. For the August 1,1996 public meeting, the contact list consisted of 60 interested parties and government representatives. An additional 200 notices were submitted to Council member Williams to distribute. It is NYSDEC policy to notify the immediate neighborhood adjacent to a problem area. Since the contamination is not present on residential properties and is not impacting the water supply or nearby residents, the mailing list initially contained only the residents who are immediately adjacent to the site. However, NYSDEC continued to add anyone who inquired about the project to our mailing list.

Q. **Would you handle this problem the same way if it were in Amherst?**
A. Our investigation and remediation process is the same regardless of the location of the site.

Q. **Is it possible for a committee to be formed to be involved in this site?**
A. The NYSDEC encourages the formation of a Citizen's Advisory Committee. A committee has been formed and it had its first meeting on August 21, 1996 .

INVESTIGATIONS

Q. **Has the contaminated area been defined ? What has been done to assure the community that there is no problem?**

A. The extent of contamination was determined during the on-site and off-site investigations and is outlined in Figures 4 and 5 in this document. Those investigations have shown that the contaminants are not present in the residential area.

Q. **Which way does the groundwater flow?**
A. As described in Section 1 of the ROD, the shallow groundwater flows towards the south east while the deep groundwater flows towards the west.

Q. **Was any testing done across the street? When were the wells along Ellicott Street tested? How often will they be sampled in the future?**
A. The wells installed across the street to determine if groundwater in this area had been contaminated were tested in January 1991, December 1992, and February 1993. Testing did not show any significant contamination in these wells. Also a soil gas survey was done along the curb. Only one out of 17 samples showed a trace of petroleum related compounds. In fact, no contamination was found in this survey that could be linked to the problems at Osmose. However in order to assess the petroleum contamination found in the soil gas survey, a well was installed. The subsurface soil samples (up to 12 feet depth) collected during installation of this well did not show any petroleum contamination. This confirms that the contaminants detected in soil gas survey resulted from a surface spill. Under the Long Term Monitoring Plan, specific wells along the Ellicott Street will be tested annually.

Q. **What is there to prevent contamination from moving farther?**
A. The site investigations have shown that the BSA sewer (approximately 4.5x7 feet) is acting as a barrier and has prevented further migration. At present, the Light Non-Aqueous Phase Liquid (LNAPL) or oily material is being pumped out. The pumping of groundwater and LNAPL is pulling contaminants towards the wells located on Osmose property and is helping to prevent any off-site migration of the contaminants.

Q. **Do you know if the contaminants are moving along the sewer?**
A. Monitoring wells were installed in the bedding along the sewer to find out if migration of contaminants along the sewer had occurred. The investigation has shown that contaminants have not migrated along the sewer beyond Monitor well MW-25 (See Figure 5).

Q. **There are underground springs, could the groundwater be flowing in other directions? Could chemicals be moving out between the monitoring wells through springs or other ways that you didn't detect?**
A. The groundwater flow pattern was based on the information collected from a number of wells installed at the site during site investigations. Twenty seven monitoring wells were installed to determine the groundwater flow and extent of contamination. Some wells are only 14 feet apart. Groundwater flow directions were calculated using comprehensive data covering different time periods. The NYSDEC is confident in the flow directions as described in Section 1 in the ROD. Based upon the groundwater survey at this site, no springs exist in the project area.

Q. **Will these chemicals leach?**

A. The contaminants at the Osmose Site have relatively low solubility in water and hence low leaching effect. As shown in Fig. 5 in this document, the chemicals have already leached out up to the sewer from the source area. With the removal of LNAPL, leaching will considerably decrease.

Q. **What kind soil is under the site and what is under the street?**

A. Beneath the surficial fill (0-4ft.), the site is underlain by a layer of approximately 7 feet of silty clay soil which is considered highly impermeable (which means - it does not allow water to move through easily). The utility lines (water and gas) are known to be buried at about 3-5 feet depth along the side walk on the west side of Ellicott Street. In the middle of the street, a 7 ft. high and 4.5 ft. wide box sewer is buried to a depth of approximately 10 ft. below grade.

DATA

Q. **What are the contaminant levels at this site.?**

A. The levels of contaminants are shown in Tables 1 - 3 in the ROD.

Q. **Are you independently taking your own samples?**

A. In order to check the results of the consultant hired by Osmose, NYSDEC randomly split samples in the field and had them tested by a different laboratory.

Q. **Who verifies the results of the testing Osmose has done?**

A. Osmose has retained an independent consultant- Fluor Daniel GTI, Inc. (formerly Groundwater Technology)- to collect samples. The samples were tested by a NYSDOH approved Laboratory. A Quality Control and Quality Assurance check was performed to assess the validity of the test results. Moreover, NYSDEC also split some samples with Groundwater Technology and sent them to its own contract laboratory.

Q. **Why was the data not brought to the public meeting ?**

A. The test results are summarized in the PRAP. The test data is quite voluminous and can be found in the reports which are available in the document repositories at the North Jefferson Public Library Branch and at the NYSDEC office at 270 Michigan Ave., Buffalo.

REMEDY

Q. **Will the selected remedy/ ozone treatment solve the problem?**

A. In accordance with the selected remedy, the oily liquid or LNAPL should be removed in approximately 3 - 4 years. Once the LNAPL is removed, the ozone treatment will degrade remaining contaminants in soil and groundwater. Ozone treatment will continue until soil cleanup levels are met. In 1993, a pilot study was done at the site to determine the effectiveness of destruction of contaminants by ozone . The results showed approximately 94 % reduction in the levels of contaminants where there was no LNAPL. Therefore, we are confident that the selected remedy will work. Under the selected remedy, the source of the contaminants will be eliminated. If at the end of ozone treatment process, elevated levels of contaminants still remain in groundwater, further remediation may be required.

Q. **If there is a leak in the biocell, what is happening to the oil?**
A. The oil is outside the biocell and is leaking into the cell. Under the selected remedy, the LNAPL would also be removed from the biocell prior to ozone treatment.

Q. **How long will it take to pump out the oil from the soil? Will the oily material ever come to the surface, like 20 years from now ?**
A. The extraction of oily material began in 1993 and is continuing. It is estimated that all the oily material will be pumped out in the next 3-4 years. The long term monitoring would confirm this fact and that, because the material was removed, it would never come to the surface.

GENERAL/OSMOSE

Q. **Why has Osmose done this remedial work ? Was this work done voluntarily?**
A. In order to address the contamination problems created due to leakage of chemicals (creosote and fuel oil # 2) from the Osmose underground storage tanks, Osmose has undertaken full responsibility to remediate this contamination problem. Osmose entered into a legal agreement with the NYSDEC to investigate and remediate the site. All the work done by Osmose is reviewed, approved and overseen by the NYSDEC.

Q. **Will the plant remain in operation during the remediation or will it close down ?**
A. The contamination is in the parking lot of the Osmose facility. The site remediation would not affect the plant operations. Therefore during remediation, the plant does not have to be closed.

Q. **What measures are being taken by Osmose to prevent similar problems in the future? How will you know if the new tanks are leaking?**
A. Except for one tank, all other tanks are above ground tanks. The tanks are placed on specially constructed cement pads with berms to catch any spillage and conform to the NYSDEC Bulk Storage Tank requirements. The tanks will be tested for their integrity according to the Permit Requirements.

Q. **Does Osmose use water in their process? Do they discharge any water to the sewer? What happens to the wastes produced at the plant?**
A. Osmose does use some process water and most of it gets recycled . Any water which is not recycled is discharged to the sewer under the Buffalo Sewer Authority Permit. Any wastes produced from the manufacturing processes are disposed off-site at permitted facilities.

Q, **Who did the Risk Assessment?**
A. Osmose contracted Groundwater Technology, which is an independent consultant to do the risk assessment. The risk assessment was completed by toxicologists supervised by a medical doctor specializing in the identification of human risks associated with exposure to chemicals. This risk assessment was reviewed by the NYSDOH.

Q. **Is the City concerned that this might be impacting the Rapid Transit Line ?**
A. The Rapid Transit line is west of the site. The wells installed along the west side of Osmose site did not show any contamination. Also investigations have shown that contamination has moved towards the southeast instead of the west. Therefore, the contamination is not impacting the Rapid Transit Line.

B. NYSDOH RESPONSES:

The following are responses to the health-related questions asked at the Osmose Wood Preserving public meetings on July 9, 1996, and August 1, 1996, for the Proposed Remedial Action Plan. The specific questions asked at the meetings have been listed and then summarized into a general question for each response.

Q: How do I know this contamination is not affecting me? **Q:** What is the safe level for carcinogens for the contaminants at the site? **Q:** What is the safe level for human consumption? **Q:** Is the situation safe for me now, I live across the street? **Q:** What happens if you breathe the vapors from the contamination? **Q:** How would we know if these contaminant were in our basement?

Can these chemicals affect my health?

RESPONSE: No, not unless you come into contact with them, which is unlikely. Although some potential cancer-causing compounds exist at the site, these compounds are located many feet below the ground surface in soils and groundwater that are inaccessible to the general public. All on-site contaminated soils are paved over by the Osmose parking lot and are approximately seven feet below the ground surface. Local residents are using either public water or bottled water for drinking purposes, and no one drinks the groundwater in the area. While we were told by one resident that there are private water supply wells in the area, we have not confirmed this. Otherwise, no one is being exposed to or coming in contact with site-related contaminants. No matter how dangerous a substance or activity is, without exposure, it cannot harm you. There is no reason to believe that the health of neighbors has been or will be adversely affected by site contaminants. The selected cleanup levels are considered protective of human health.

Q: How do you know the drinking water in my home is not affected by the contamination from the site? Q: Has the drinking water been tested? Q: What about the water lines, there must still be some contamination leaking into the drinking water? Q: What are the levels of carcinogenic compounds allowed in drinking water and how do those levels compare with the levels found at the site? Q: You sampled the water, did you also test the water last year? Q: How can the other residents get their water tested? Q: Given that the water is good now, how do I know that it did not hurt me in the past? Q: With all the taxes we pay, why can't you do house testing? Q: Can you guarantee that the drinking water is not contaminated?

Does contaminated groundwater from the site affect the public drinking water supplied to the area residents?

RESPONSE: No. The public water pipes are not in contact with or sitting in Osmose chemicals, in addition, the high pressure of the water pipes would make it next to impossible for site-related chemicals to seep into the pipes. Local residents are supplied with public water from the City of Buffalo which pumps the water from Lake Erie. The public water is tested regularly by the City of Buffalo before distribution to ensure that the water is suitable for drinking. The water is distributed to your home through buried pipes that are under constant pressure. Even if there was a hole in the pipe or a small leak, the pressure of the water in the pipe is so high that it would force the water out and not allow anything in. On July 10, 1996, in response to several residents' concerns, New York State Department of Health (NYSDOH) staff collected a water sample from an outdoor faucet at a residence that is across the street from the Osmose plant site. No Osmose chemicals were found in this water sample. Laboratory results were shared with the community. When dealing with the public water supply system, one sample is a good test of the water quality in the immediate area. The NYSDOH has no plans to collect additional samples of the public water supply because nothing was found in the water that represents a public health concern.

Q: What will you do to protect the community while remediation is underway? Q: Will the work harm pregnant women in the area or people walking by the site? Q: When you dug the bio-cell, was the community exposed then? Q: What type of air monitoring has been done at the site? Q: What type of air monitoring will be done during remediation? Q: Are you going to look for vapors during the remediation?

How is the community protected during any investigation or cleanup activities?

RESPONSE: A Health and Safety Plan is currently in place and will remain in place for all site-related work activities. The plan has a section specifically devoted to protecting the community. As part of the section, air monitoring of dust and site-related contaminants is required to ensure that none of the contamination blows off the site toward residential areas. If problems occur on the site, work will immediately shut down and the problem will be evaluated. Work will not restart until the problem has been resolved. Site security has been and will be maintained to prevent needless exposures to unauthorized individuals. Living near or walking by the site will not harm you.

Q: If kids were playing around the manhole, could they be affected?

RESPONSE: The City of Buffalo sewer line that is directly in front of the Osmose facility was tested during past investigations for Osmose site-related chemicals. No Osmose site-related chemicals were detected in the sewers; therefore, anyone near the manhole would not be affected.

Q: Can my doctor test me to find out if I have been affected by these contaminants?

RESPONSE: Exposure to site contaminants by community members is not expected because the on-site contaminants are located approximately seven feet below ground surface under a paved parking lot, and access to the site is restricted. The adjacent residential area is served by public water, and no known private wells exist in the area. Therefore, there are no completed routes of exposure to the contaminants at this site. (The route of exposure is the manner by which a contaminant actually enters or contacts the body, for instance through ingestion (eating), inhalation (breathing), or absorption (contact) through the skin.)

However, in response to the question, medical testing does exist to determine if an individual has been exposed to specific contaminants found at the site, or breakdown by-products, in body fluids or tissue. This testing cannot accurately predict whether an individual may experience health effects as a result of an exposure. Since these tests are not done routinely, some tests may not be available through a doctor's office or laboratory without special equipment. Many of these substances or their by-products quickly leave the body. Therefore, measurements may be accurate only for a recent exposure.

Q. Are you aware that some people in the area still use well water?

RESPONSE: We are not aware of any private wells existing near the Osmose Wood Preserving site. If any residents are drinking private well water in the area, we would like to know. We encourage residents to contact the NYSDOH toll-free at 1-800-458-1158, extension 309, so that we may test their well water.

APPENDIX B

ADMINISTRATIVE RECORD

OSMOSE WOOD PRESERVING, Inc.
Site No. 915143

1. Record of Decision..December, 1996

2. Proposed Remedial Action Plan..June, 1996

3. Feasibility Study Report..December, 1995

4. Sewer Sampling Results..August, 1995

5. Sewer Sampling Work Plan...July, 1995

6. Off-Site Surface Soil Removal Report....................................January, 1995

7. LNAPL - IRM Upgrade Work Plan..September, 1994

8. Off-Site Surface Soil Excavation Work Plan...............................August, 1994

9. Ozone Injection Feasibility Study Report..................................April, 1994

10. Supplemental Investigation (Phase II) Report............................August, 1993

11. Supplemental Investigation (Phase II) Work Plan........................March 1992

12. Ozone Pilot Test Work Plan..September, 1992

13. Supplemental Investigation Report...June, 1992

14. Supplemental Investigation Work Plan.......................................March, 1992

15. Subsurface Investigation Report..June, 1991

16. Subsurface Investigation Work Plan...June, 1990

17. Design of Biocell for in-Situ Bioremediation of soils.........................January, 1990

18. Consent Orders: Bioremediation & Site Investigation (B9-0314-90-01)......February, 1990
    IRM & Feasibility Study (B9-0314-90-01)..................April, 1995

19. Relevant Corrospondence:

G.A. Carlson to M.J. O'Toole, NYSDOH concurrence letter for Record of Decision, 11/22/96.

G.A.Carlson to M.J. O'Toole, NYSDOH concurrence letter for Proposed Remedial Action Plan, (6/27/96).

Jaspal S. Walia to Bruce Ahrens (Fluor Daniel - GTI), Acceptance of Feasibility Study, (1/8/96).

Jaspal S. Walia (NYSDEC) to Bruce Ahrens , Comments on the LNAPL upgrade work plan (1/19/95).

Jaspal S. Walia to Bruce Ahrens, Acceptance of work plan to remove off-site surface soil (9/23/94).

Martin Doster (NYSDEC) to Bruce Ahrens, Acceptable Clean up levels, (3/28/94).

Jaspal S. Walia to Bruce Ahrens, Acceptance of Supplemental Investigation work plan, (3/16/92).

Jaspal S. Walia to Michael Rider (Osmose), Acceptance of Subsurface Investigation work plan, (7/2/90).