PROPOSED REMEDIAL ACTION PLAN

Operable Unit 1 - Shallow Groundwater and Soils

DAVIS-HOWLAND OIL COMPANY

Rochester, Monroe County, New York
Site No. 8-28-088
February 1997

SECTION 1: PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) is proposing a remedy which combines excavation and off-site disposal of metals contaminated soils, sparging to remove shallow groundwater contamination with vapor extraction as needed, and monitoring of groundwater to confirm the long-term effectiveness of the remedy, for the Davis-Howland Oil Company site. This remedy is proposed to address the threat to human health and the environment created by the presence of volatile organic solvents in shallow groundwater and metals in surface soils.

This Proposed Remedial Action Plan (PRAP) identifies the preferred remedy, summarizes the other alternatives considered, and discusses the rationale for this preference. The NYSDEC will select a final remedy for the site only after careful consideration of all comments submitted during the public comment period.

The NYSDEC has issued this PRAP as a component of the citizen participation plan developed pursuant to the New York State Environmental Conservation Law (ECL) and state regulation 6 NYCRR Part 375. This document summarizes the information that can be found in greater detail in the Remedial Investigation (RI) and Feasibility Study (FS) reports available at the document repositories.

The NYSDEC may modify the preferred alternative or select another alternative based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified here.

To better understand the site, and the alternatives evaluated, the public is encouraged to review the project documents which are available at the following repositories:

Rochester Public Library
Rundel (Central) Branch
115 South Avenue
Rochester, New York 14604
(716) 428-7338
Contact: Local History Documents

NYSDEC Region 8 Headquarters
6274 East Avon-Lima Road
Avon, New York 14414
(716) 226-2466
Contact: Joe Hamm, Citizen Participation Specialist

NYSDEC Central Office
50 Wolf Road

Albany, New York 12233-7010
(518) 457-0315
Contact: Michael DiPietro, Project Manager

Written comments on the PRAP can be submitted to Mr. DiPietro at the above address.

DATES TO REMEMBER:

February 18 - March 20 Public comment period on RI/FS Report, PRAP, and preferred alternative.

March 5, 1997 at 7:00 PM Public meeting at Writers & Books, 740 University Avenue, Rochester.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Davis-Howland Oil Company site is defined as adjacent parcels of land located on Anderson Avenue in the City of Rochester, Monroe County. Those adjacent parcels are described as 190-220 Anderson Avenue and the portion of 176 Anderson Avenue immediately north and west of 190-220 Anderson. See Figure 1 for the location map and Figure 2 for the detailed site map. The site is approximately 1 acre in size. The site is situated in an area which combines residential, commercial, and industrial facilities. No significant surface water is located in the immediate area of the site. The site is bounded on the south by Anderson Avenue, west by light industrial and commercial/retail buildings, and on the north and east by Conrail tracks and right-of-way.

The site is underlain by a thin fill layer (2-5 feet thick), outwash sand and gravel (5-20 feet), glacial till (5-15 feet), and bedrock consisting of the Penfield Dolostone. Shallow groundwater is encountered in the outwash and deep groundwater is encountered in the bedrock unit. The area is served by the public water supply system and we are aware of no local groundwater usage.

Operable Unit No. 1, which is the subject of this PRAP, consists of shallow groundwater, surface soil, and subsurface soil.
An Operable Unit represents a portion of the site remedy which for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. The remaining operable unit for this site is described in Section 3.2 below.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

During the course of operations at the Davis-Howland site there were evidently numerous incidences when material leaked or were spilled onto the ground. There is no single occurrence which can be blamed for the majority of the contamination now found at the site.

Between 1974 and the early 1990s, there were many reports to the NYSDEC of releases of materials ranging from waste oil and mineral oil to hydrochloric and sulfuric acids at the Davis-Howland site.

In June 1991, the NYSDEC staff inspected the site in response to a report of an oil spill. They found several hundred drums of oils and solvents and several areas of stained soils.

3.2: Remedial History

In June 1991, NYSDEC staff inspected the site and identified numerous drums, some of which were leaking. A follow-up inspection was conducted which included soil sampling and the containerizing of l-- king drums. Soil sampling

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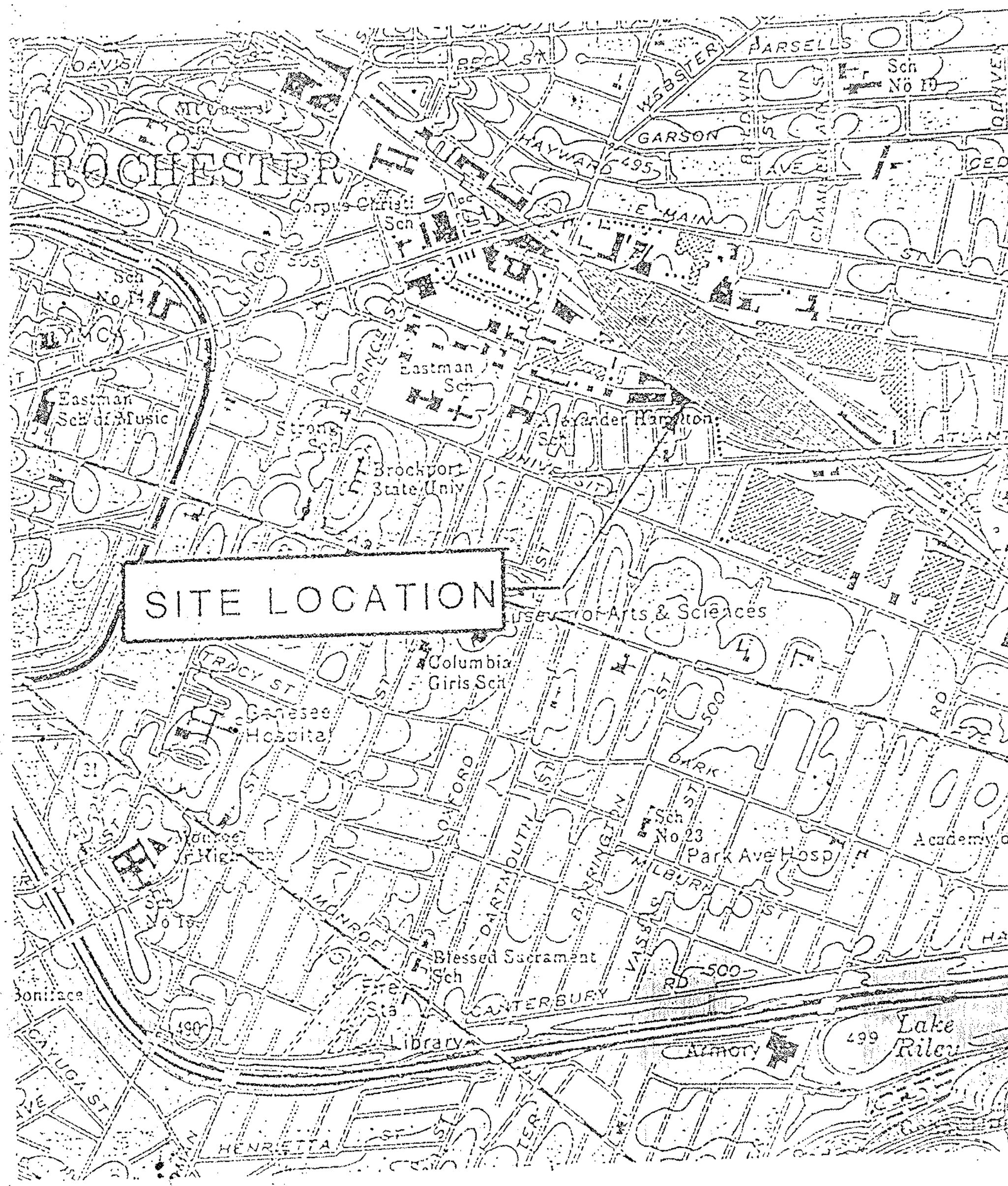
LOCATION PLAN

DAVIS-HOWLAND OIL CORPORATION, ROCHESTER, NY (NYSDEC SITE. NO. 8-28-088)



LOCATION PLAN

NOT TO SCALE

FIGURE 1

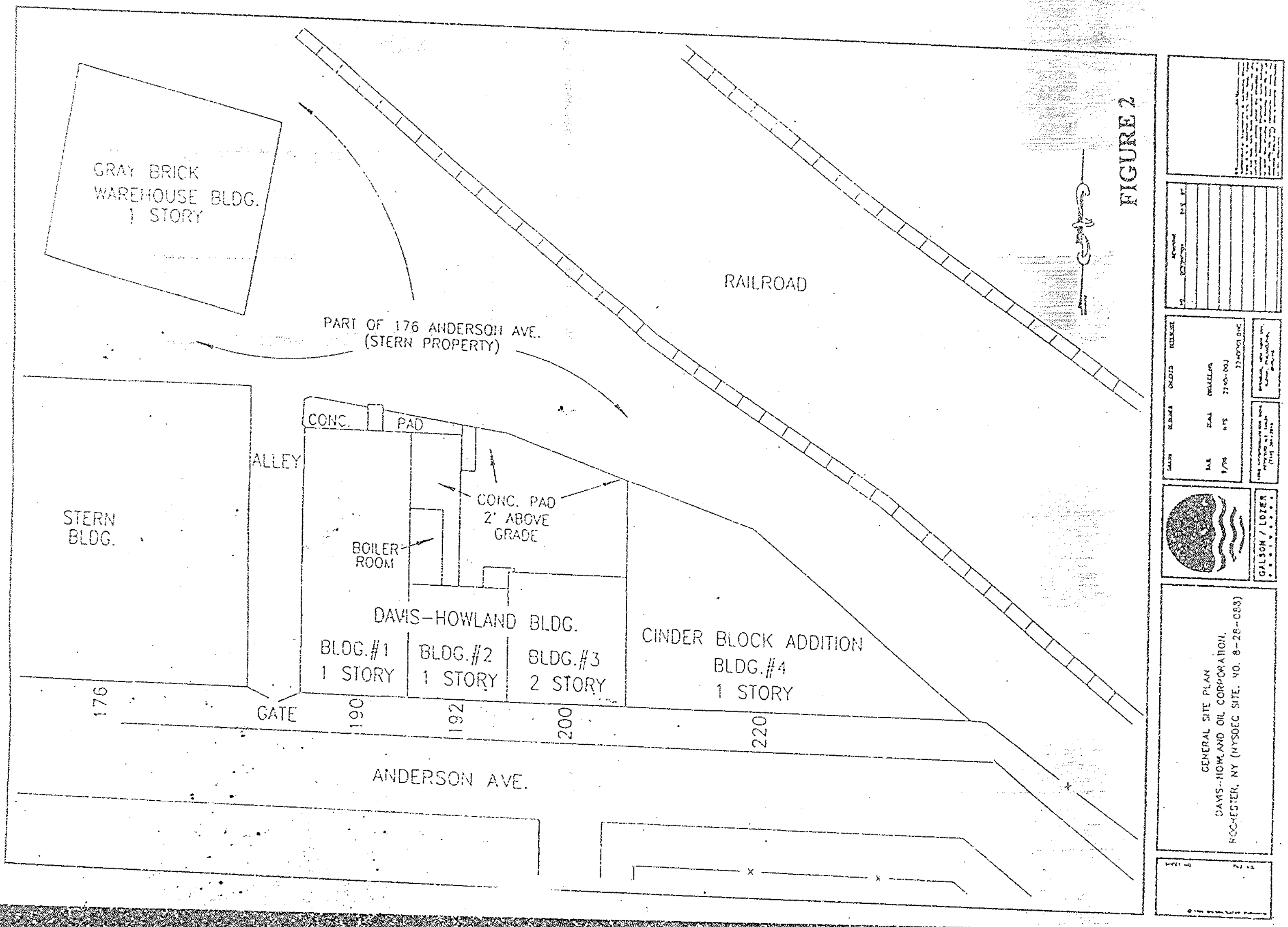

GRAY BRICK WAREHOUSE BLDG. 1 STORY
PART OF 176 ANDERSON AVE. (STERN PROPERTY)
RAILROAD
STERN BLDG.
ALLEY
CONC. PAD
CONC. PAD 2' ABOVE GRADE
BOILER ROOM
DAVIS-HOWLAND BLDG.
BLDG.#1 1 STORY
BLDG.#2 1 STORY
BLDG.#3 2 STORY
CINDER BLOCK ADDITION BLDG.#4 1 STORY
176
GATE
190
192
200
220
ANDERSON AVE.
GALSON / LOZIER
GENERAL SITE PLAN
DAVIS-HOWLAND OIL CORPORATION
ROCHESTER, NY (NYSDEC SITE NO. 8-28-083)

FIGURE 2

indicated that soil was contaminated with petroleum and solvents.

In October 1991, Dunn Geosciences performed a soil investigation for Davis-Howland. They confirmed the results of the initial DEC inspection.

From April through June 1992, Clean Harbors, Inc. conducted a soil and groundwater sampling effort. Results of this investigation indicated soil contamination and significant contamination of groundwater with chlorinated and non-chlorinated solvents. During the same period, Clean Harbors also conducted a drum removal and surface soil excavation and removal. The soil removal consisted of the removal of the top one foot of soil and subsequent offsite disposal.

In December 1994, the NYSDEC resampled the Clean Harbors wells and found similar types of contamination.

Operable Unit 2 (OU2), consists of the bedrock aquifer in the vicinity of the Davis-Howland site. The bedrock groundwater is contaminated by compounds similar to those described in this PRAP as being present in the shallow groundwater and soils. This deeper groundwater will be addressed in a future document after further assessment of the nature and extent of bedrock groundwater contamination and the clarification of uncertainties which have been identified. The nature and extent of this contamination, as we now understand it, are described in the rest of this PRAP. Areas of current uncertainty include the total areal extent of the contamination and details of flow rates and exact direction.

SECTION 4: CURRENT STATUS

In response to a determination that the presence of hazardous waste at the Site presents a significant threat to human health and the environment, the NYSDEC has recently completed a Remedial Investigation/Feasibility Study (RI/FS).

4.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site.

The RI was conducted in two phases. The first phase was conducted between July 1995 and October 1996, the second phase between November 1996 and January 1997. A report entitled "Davis-Howland Oil Corporation Remedial Investigation," dated October 1996, has been prepared describing the field activities and findings of the Phase I RI in detail.

The RI included the following activities:

- Area well inventory and literature search.
- Soil gas survey to help define the limits of contamination.
- Piezometer and monitoring well installation to collect groundwater samples and determine the direction of groundwater flow.
- Surface and subsurface soil sampling and analysis.
- The installation of exploratory soil borings.
- The sewer line near the site was inspected using a remote camera system.
- An exposure pathway analysis and habitat based assessment were conducted

to determine potential impacts to humans and the environment.

To determine which media (soil, groundwater, etc.) contain contamination at levels of concern, the RI analytical data was compared to environmental Standards, Criteria, and Guidance (SCGs). Groundwater, drinking water and surface water SCGs identified for the Davis-Howland Oil Company site were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of NYS Sanitary Code. NYSDEC TAGM 4046 soil cleanup guidelines for the protection of groundwater, background conditions, and risk-based remediation criteria were used as SCGs for soil.

Based upon the results of the remedial investigation in comparison to the SCGs and potential public health and environmental exposure routes, certain areas and media of the site require remediation. These are summarized below. More complete information can be found in the RI Report.

Chemical concentrations are reported in parts per billion (ppb) and parts per million (ppm). For comparison purposes, SCGs are given for each medium.

4.1.1 Nature of Contamination:

As described in the RI Report, many surface soil, subsurface soil and groundwater were collected at the Site to characterize the nature and extent of contamination.

During the RI soil and groundwater samples were analyzed for volatile organics (VOCs), semivolatile organics (SVOCs), pesticides, PCBs, and metals. Surface soils were found to contain SVOCs including benzo(a)anthracene, benzo(a)pyrene, and chrysene, and metals including lead, chromium, cadmium, and zinc. Subsurface soils were found to contain VOCs including 1,2-dichloroethene and trichloroethene, and metals including mercury and zinc. Low levels of SVOCs were also detected in subsurface soils. Groundwater was found to contain VOCs including those found in soil, vinyl chloride, 1,1,1-trichloroethane, and xylene. The only SVOC detected at significant levels was naphthalene. Metals detected include lead and manganese. PCBs and pesticides were not detected at concentrations of concern in these media.

Some of the SVOCs detected are known to be carcinogens in animals. The metals, particularly lead, is known to have adverse health effects in humans when there is long-term exposure at high levels. The VOCs detected can have both short and long-term health effects. The short-term impacts include headaches and dizziness, the long-term effects may include damage to the central nervous system and the liver as well as other internal organs. These effects are known to occur in cases of high level and long-term exposure.

4.1.2 Extent of Contamination

The remedial investigation determined that the primary contaminated media at the site consist of soil and groundwater. These are further divided into surface soil, subsurface soil, shallow groundwater, which is found in the fill and soil overlying bedrock, and deep or bedrock groundwater which is located in the upper-most bedrock unit encountered at the site. The shallow groundwater is separated from the bedrock groundwater by a layer of material classified as a glacial till. This material consists of clay rich silt with small amounts of sand and gravel encountered.

Each of the two subdivisions of the media described above are contaminated to a greater or lesser degree. The highest level of soil contamination is found in the area behind the

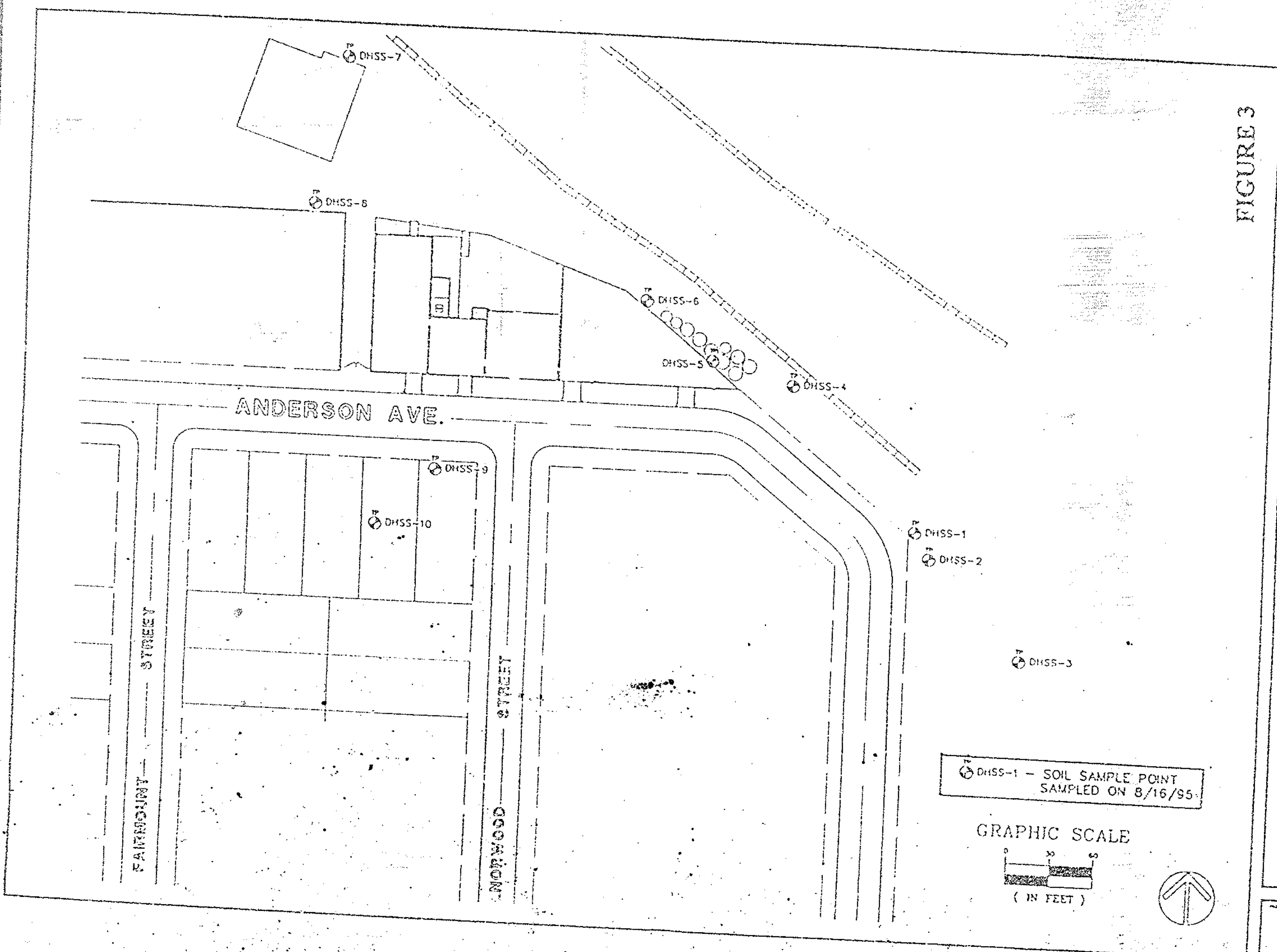


FIGURE 3

SURFACE SOIL SAMPLE PLAN

DAVIS-HOWLAND OIL CORPORATION, ROCHESTER, NY (NYSDEC SITE NO. 8-28-088)

Table 1: Representative Contaminants
Davis-Howland Oil Corporation Site (No. 8-28-088)

Overburden Groundwater

Contaminant	Concentration Range, ppb			SCG (ppb)	No. that Exceed	No. of Samples
	Minimum	Maximum	Average			
1,1-Dichloroethane	2.2	2800	875	5	8	11
1,2-Dichloroethene (total)	5	98000	20935	5	8	11
1,1-Dichloroethene	5	3900	977	5	8	11
Ethylbenzene	5	2500	629	5	8	11
Toluene	5	3400	690	5	8	11
1,1,1-Trichloroethane	1.1	34000	5149	5	8	11
Trichloroethene	5	98000	16595	5	9	11
Vinyl Chloride	5	5800	1723	2	11	11
Xylene	5	9600	1620	5	8	11
1,2-Dichlorobenzene	5	580	57	4.7	11	11
Naphthalene	1.3	290	33	10	3	11
Lead	0.5	819	79	15	1	11
Manganese	114	2590	814	300	8	11

Bedrock Groundwater

Contaminant	Concentration Range, ppb			SCG (ppb)	No. that Exceed	No. of Samples
	Minimum	Maximum	Average			
1,2-Dichloroethene (total)	300	8600	2866	5	8	8
Vinyl Chloride	56	840	402	2	8	8
Trichloroethene	27	740	319	5	8	8
1,1-Dichloroethene	8	88	33	5	8	8
1,1,1-Trichloroethane	10	190	67	5	8	8
1,1-Dichloroethane	28	390	101	5	8	8
4-Methyl-2-Pentanone	5	640	164	50	3	8

Surface Soil

Contaminant	Concentration Range, ppm			SCG (ppm)	No. that Exceed	No. of Samples
	Minimum	Maximum	Average			
Benzo(a)anthracene	0.19	37	4.5	0.33	8	10
Benzo(a)pyrene	0.11	26	3.4	0.33	7	10
Chrysene	0.26	33	4.3	0.4	8	10
Dibenz(a,h)anthracene	0.035	11	1.6	0.33	4	10
Cadmium	0.21	39.6	4.7	10	1	10
Chromium	6.1	80.1	22.5	50	2	10
Lead	8.8	2020	482.3	500	3	10
Zinc	52.4	43800	4573.5	160	6	10

Non-detects entered at approx. one-half of detection limit.

Table 1: Representative Contaminants
Davis-Howland Oil Corporation Site (No. 8-28-088)

Subsurface Soil

Contaminant	Concentration Range, ppm			SCG (ppm)	No. that Exceed	No. of Samples
	Minimum	Maximum	Average			
1,2-Dichloroethene (total)	0.003	2.9	0.40	0.3	3	18
Toluene	0.0035	4.6	0.26	1.5	1	18
Trichloroethene	0.004	6.4	0.44	0.7	2	18
Xylene	0.003	5.1	0.30	1.2	1	18
Benzo(a)anthracene	0.032	0.3	0.17	3	0	18
Fluoranthene	0.047	1.0	0.25	50	0	18
Phenol	0.038	1.0	0.19	0.33	1	18
Zinc	12.8	139.0	38.27	160	0	18

Non-detects entered at approx. one-half of detection limit.

Davis-Howland building. Shallow soils are contaminated with SVOCs and metals, and subsurface soils with VOCs and, to a lesser extent, SVOCs and metals. Groundwater contamination is highest in shallow groundwater with the area behind the building showing the highest levels. The bedrock groundwater is contaminated at levels generally an order of magnitude less than that observed in shallow groundwater.

Table 1 summarizes the extent of contamination for the contaminants of concern in soils and groundwater and compares the data with the proposed remedial action levels (SCGs) for the Site. For most of the listed compounds in Table 1, a single sample point was much higher than the rest. This resulted in a substantial upward skewing of the average values for each contaminant shown. For surface soils, sample DHSS-7 generally showed the highest contaminant levels, this location is the subject of a proposed soil removal in Alternatives 2-4. The following are the media which were investigated and a summary of the findings of the investigation.

One of the SCGs relevant to this site is TAGM 4046 which presents soil clean-up objectives. Some of the soil analysis detected the presence of several SVOCs at levels above recommended levels. While these SVOCs are found in surface soil above standards, distribution and past operations at the site seem to indicate that they are not site related. Some of the worst of this contamination would be removed with the soil which was identified as a health risk. The removal of SVOCs would not be comprehensive.

Soil

Surface Soil: After completion of the surface soil removal IRM, only trace levels of VOC contamination were found in this media. Total SVOC contamination in this media ranged from non-detect to 448 ppm. All samples except DHSS-5 had at least one exceedence of soil standards for SVOCs. In general, the highest levels of contamination were found in the area behind the site building and along the railroad tracks. Specifically, the highest levels of SVOCs consist of a class of compounds known as PAHs. These are compounds such as creosote and related chemicals. Individual SVOCs with the greatest exceedences of their soil cleanup goals were benzo(a)anthracene (37 ppm) and chrysene (33 ppm). Also found at elevated concentrations in this media were metals. Elevated levels of cadmium, chromium, mercury, lead, and zinc were detected in soil samples. The highest levels of these were detected at DHSS-7, located between the gray brick warehouse and the railroad tracks. Highest of these metals were lead (2020 ppm) and zinc (43800 ppm) (See Figure 3 for surface soil sample locations).

Two areas of surface soil contamination were identified as requiring remediation due to elevated metals contamination (see Figure 4 for locations). These two areas comprise an estimated 33 cu-yds of soil. Despite the fact that the PAHs described above are not thought to be attributable to disposal activities at the site, they are most concentrated in the vicinity of DHSS-7 and will be removed with the metals contaminated soils.

Subsurface Soil: The subsurface soil samples were higher in concentrations of VOCs and lower in SVOCs and metals. Highest VOCs were trichloroethene (6.4 ppm), xylene (5.1 ppm), and toluene (4.6 ppm). SVOCs were not encountered at levels of concern in subsurface soils. Of the metals, significant levels of mercury (0.37 ppm) were detected.

The highest levels of VOCs were generally encountered at or near the water table. They are likely to be associated with the groundwater contamination. It is likely that the metals and

SVOCs are a surface artifact and are not necessarily associated with the spillage of oils and solvents at the site.

Groundwater

Shallow groundwater flows to the south with a limited component of flow in a more easterly direction under the site. Data from the investigation indicates that the contamination levels reach non-detect just south of Anderson Avenue in front of the Davis-Howland building (see Figure 5). Highest contamination is found in the area immediately behind the Davis-Howland building.

Bedrock groundwater flows predominantly to the east in the area of the site. Bedrock contamination is greatest in the areas of monitoring wells MW-1R and MW-5R (see Figure 4) which are located on the south side of Anderson Avenue and northwest of the Davis-Howland building, respectively. Contamination levels decrease to the east of the site (see Figure 6).

It may be postulated that the difference in levels of contamination between the shallow and bedrock groundwater units are due to the glacial till between the two units. This layer inhibits the rate of migration of contamination from the near surface to the bedrock located, on average, at a depth of 20 to 25 feet.

Please note that in Table 1, groundwater contamination values are given in parts per billion (ppb). One ppm is equal to one thousand ppb.

<u>Shallow Groundwater</u>: Shallow (overburden) groundwater contamination consists primarily of the same VOCs found in subsurface soils. Highest contaminant levels were 1,2-dichloroethene and trichloroethene (both 98 ppm) and 1,1,1-trichloroethane (34 ppm). The only SVOC detected at significant concentrations was naphthalene (0.29 ppm). The only significant metal detected was lead (0.819 ppm).

<u>Bedrock Groundwater</u>: Bedrock groundwater is contaminated with most of the same components found in shallow groundwater. Levels of contamination are, for the most part, lower. Highest levels are for 1,2-dichloroethene (8.6 ppm), vinyl chloride (0.84 ppm), and trichloroethene (0.74 ppm).

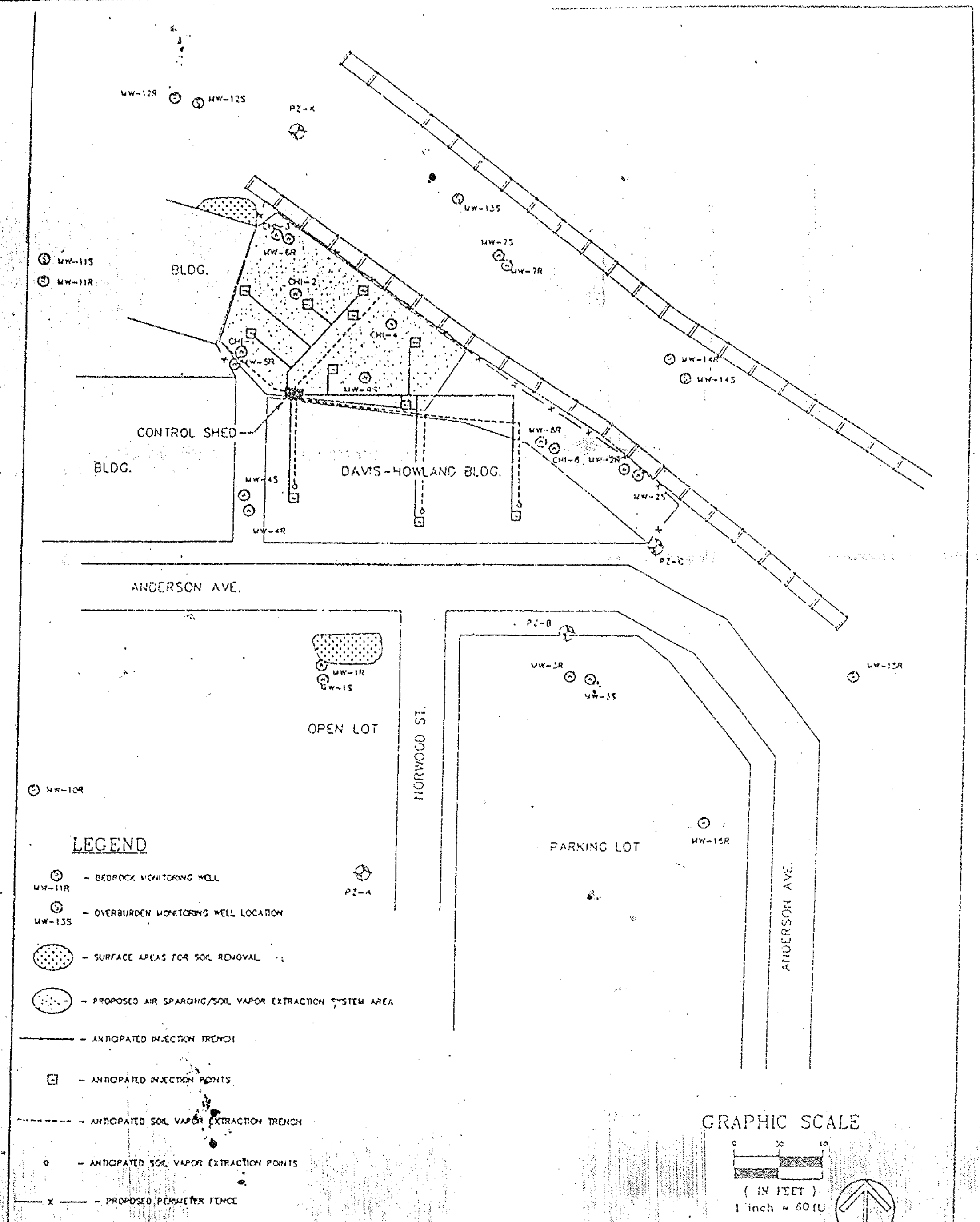
4.2 Summary of Human Exposure Pathways:

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 4.7 of the RI Report.

An exposure pathway is how an individual may come into 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.

Pathways which are known to or may exist at the site include:

- Ingestion of contaminated surface soils or groundwater. The possibility exists that people coming onto the site may ingest contaminated surface soil. This pathway is only complete for persons on the site or in the limited areas of off-site contamination. For groundwater, the only likely point of contact would be if someone were using groundwater as a drinking water source. Since local



PROPOSED REMEDIAL ACTION

FIGURE 4

PROPOSED REMEDIAL ACTION
DAVIS-HOWLAND OIL CORPORATION, ROCHESTER, NY (NYSDEC SITE. NO. 8-28-088)

CALSON / LOZIER

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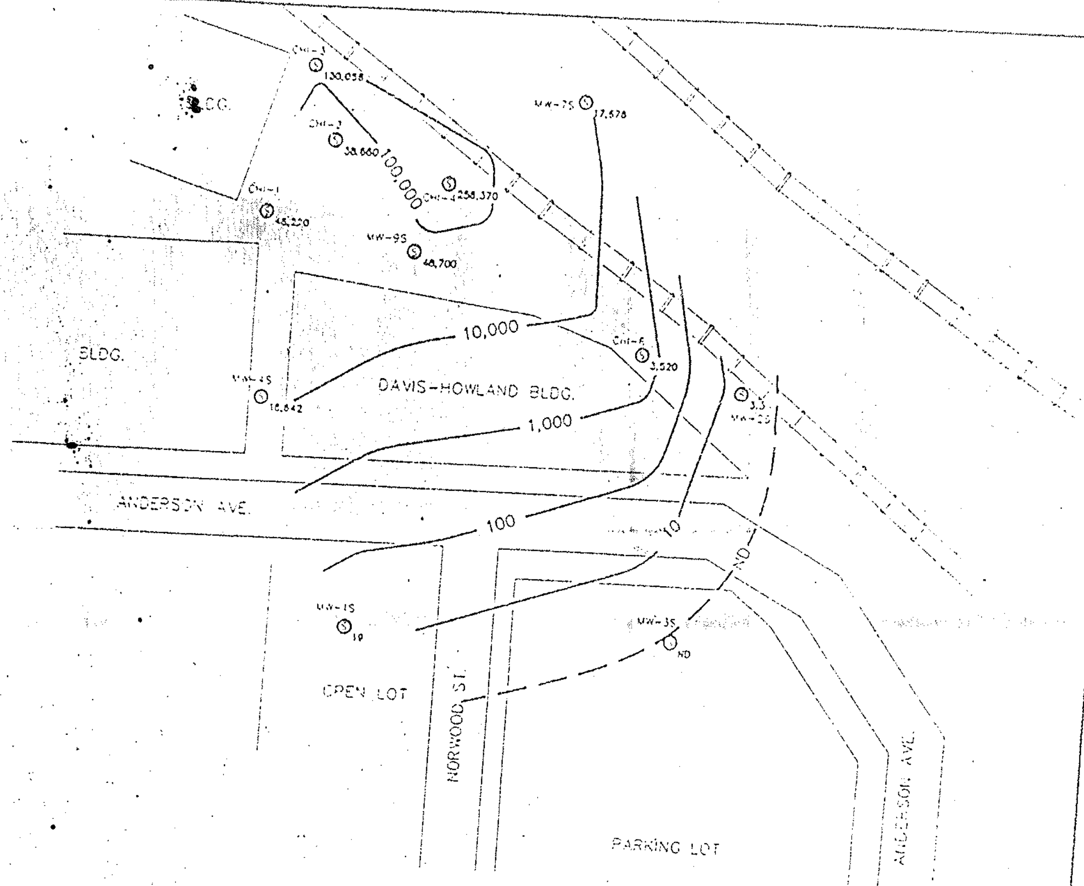


TOTAL VOC'S ISOCONCENTRATION MAP
OVERBURDEN AQUIFER OCTOBER,1995

KEY:

- MW-3S – OVERBURDEN WELL
- 3,520 – TOTAL TARGET VOC CONCENTRATION IN ug/l.
- TOTAL TARGET VOC ISOCONCENTRATION LINE (DASHED WHERE INFERRED)

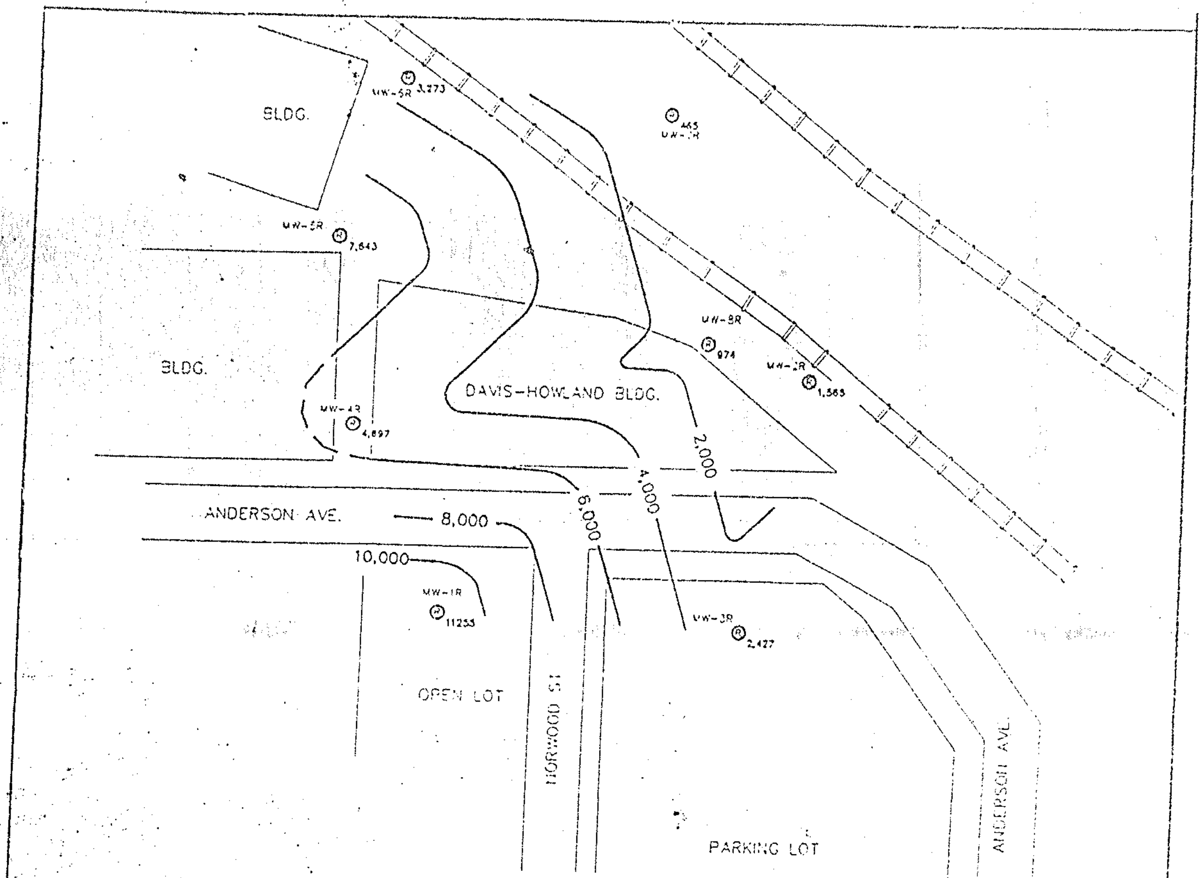
GRAPHIC SCALE

(IN FEET)

FIGURE 5

TOTAL VOC'S ISOCONCENTRATION MAP–OVERBURDEN AQUIFER OCTOBER,1995
DAVIS–HOWLAND OIL CORPORATION, ROCHESTER, NY (NYSDEC SITE NO. 8-28-088)

GALSON / LOZIER



TOTAL VOC'S ISOCONCENTRATION MAP
BEDROCK AQUIFER OCTOBER,1995

KEY:

MW-3R — BEDROCK WELL

3,520 — TOTAL TARGET VOC CONCENTRATION IN ug/l.

— TOTAL TARGET VOC ISOCONCENTRATION LINE (DASHED WHERE INFERRED)

GRAPHIC SCALE

(IN FEET)

FIGURE 6

TOTAL VOC'S ISOCONCENTRATION MAP-BEDROCK AQUIFER OCTOBER,1995
DAVIS-HOWLAND OIL CORPORATION, ROCHESTER, NY (NYSDEC SITE. NO. 8-28-088)

GALSON / LOZER

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residents are on City water this pathway is not complete.

- Inhalation of contaminated dust or volatile organic compounds (VOCs). The potential exists for inhalation of contaminated dust from the site. The most likely people to be effected by this would be onsite workers during activities which would disturb soil. VOCs are primarily found in subsurface soils and groundwater. The most likely receptors for this route of exposure would be workers digging up soil releasing VOCs or coming into contact with groundwater when VOCs are volatizing from the water. This is not currently considered a completed pathway but it may be completed in the future.

- Dermal contact with contaminated soils. This pathway is complete for individuals on the site. There is also a limited amount of off-site surface soil contamination which others could come into contact with. Dermal contact with subsurface soil would only be a completed pathway for persons conducting excavating activities on the site.

4.3 Summary of Environmental Exposure Pathways:

There is no significant habitat in the immediate area of the site which would provide an active breeding or dwelling area for most wild species. Only those animals which have shown tolerance for urban dwelling can reasonably be expected in the area of the site. The Fish and Wildlife Impact Assessment included in the RI presents a more detailed discussion of the potential impacts from the site to fish and wildlife resources.

SECTION 5: 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 Potential Responsible Parties (PRP) for the site, documented to date, include: the Davis-Howland Oil Company.

The PRPs failed to implement the RI/FS at the site when requested by the NYSDEC. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the NYSDEC will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the State for recovery of all response costs the State has incurred.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all Standards, Criteria, and Guidance (SCGs) and be protective of human health and the environment.

At a minimum, the remedy selected should eliminate or mitigate all significant threats to the public health and to 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:

- Eliminate the potential for direct human contact with the contaminated soils on site.
- Mitigate the impacts of contaminated groundwater to the environment, to the extent practicable.
- Prevent, to the extent possible, migration of soil contaminants to groundwater.
- Provide for attainment of SCGs for groundwater quality at the limits of the area of concern (AOC), to the extent practicable.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy should be protective of human health and the environment, be cost effective, comply with environmental standards, criteria, and guidance, and utilize permanent solutions, alternative technologies, or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Davis-Howland Oil Company site were identified, screened and evaluated in a Feasibility Study. This evaluation is presented in the report entitled Davis-Howland Oil Company Feasibility Study, dated January 1997.

A summary of the detailed analysis follows. As used in the following text, the time to implement 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.

7.1: Description of Alternatives

The potential remedies are intended to address the contaminated soil and groundwater at the site.

Alternative 1: No Action + Monitoring

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. 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:	$ 77,900
Capital Cost:	$ 0
Annual O&M:	$ 12,000
Time to Implement	Immediate

Alternative 2: Shallow Groundwater Extraction + Groundwater Treatment + Targeted Surface Soil Excavation and Offsite Disposal + Groundwater Monitoring

This alternative would collect shallow groundwater from the area of highest contamination located in the back of the Davis-Howland building using several extraction wells. Shallow groundwater extraction would target the highest levels of contamination. The goal for this procedure is to remove groundwater contamination which , might in the future, impact human health through exposure in nearby basements or sumps. This pumping would not necessarily achieve drinking water standards, but would be an effective source control. Groundwater would be treated prior to discharge to the sanitary sewer through the use of an air stripper to remove VOCs which constitute the majority of the groundwater contamination. Two areas of surface soil contamination were identified as warranting action. These are located just north of MW-1S and 1R and northwest of MW-6R. These soils are impacted by significant metals contamination. These soils would be excavated and disposed of offsite. Monitoring of groundwater contamination and levels would be conducted in order to assess the effectiveness of the remedy.

Present Worth:	$	824,386
Capital Cost:	$	185,864
Annual O&M:	$	87,600
Time to Implement		6 months

Alternative 3: Shallow Groundwater Sparging+Vapor Extraction+Targeted Surface Soil Excavation and Offsite Disposal+Groundwater Monitoring

Alternative 3 would entail the installation of several air sparging points in the areas of highest shallow groundwater contamination. Air sparging would strip VOCs from the groundwater. As needed, vapor extraction points would be installed to collected the VOCs released from groundwater and enhance the removal of VOCs found in soil. Soil removal and disposal. and monitoring would be done in the same manner as described in Alternative 2.

Present Worth:	$	478,196
Capital Cost:	$	182,015
Annual O&M:	$	61,000
Time to Implement		6-9 months

Alternative 4: In Well Air Stripping+Targeted Surface Soil Excavation and Offsite Disposal+Groundwater Monitoring

In well air stripping would be utilized to remove VOCs from shallow groundwater in this alternative. These wells utilize air lift to circulate water from a screened zone located below the water table and discharging the water from a screen located in the zone above the water table. As the air moves the water upward, bubbles strip VOCs from the water. The VOCs are removed under low vacuum from the well. The other elements of this alternative would be the same as in Alternative 2.

Present Worth:	$	738,163
Capital Cost:	$	414,064
Annual O&M:	$	61,000
Time to Implement		6 months

7.2 Evaluation of Remedial Alternatives

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. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

The Feasibility Study identified SCGs for this site. The most significant of the SCGs, by media, include the following:

Soil

TAGM HWR-94-4046, Guidance regarding soil clean-up levels.

6 NYCRR Part 376, Land disposal regulations (LDRs).

Groundwater

6 NYCRR Part 703, Ambient Water Quality Standards and Guidance Values

6 NYCRR Parts 750-758 State Pollution Discharge Elimination System (SPDES).

Municipal Sewer Permit, Requirements covering new discharges to the local sanitary sewer.

Air

6 NYCRR Part 212

NYSDEC Air Guide 1.

Alternative 1, No Action, would not change current conditions at the site. Since there are currently contraventions of the soil and groundwater SCGs, it would not achieve the SCGs.

Alternative 2, would address shallow groundwater contamination through extraction and treatment. It might eventually achieve groundwater SCGs. Surface soil excavation would address soil contamination in the areas which have the most significant identified surface soil contamination, however, areas of soil would remain with exceedences of soil clean-up criteria. It is not anticipated that contaminant levels in excavated soil would trigger LDRs.

One of the SCGs relevant to this site is TAGM 4046 which presents soil clean-up objectives. Some of the soil analysis detected the presence of several SVOCs at levels above recommended levels. While these SVOCs are found in surface soil above standards, distribution and past operations at the site seem to indicate that they are not site related. Some of the worst of this contamination would be removed with the soil which was identified as a health risk. The removal of SVOCs would not be comprehensive.

Alternative 3, would treat shallow groundwater through the use of air sparging. It is believed that this approach would achieve better results than the extraction and treatment of shallow groundwater in Alternative 2 in approaching groundwater SCGs. Vapor extraction would collect the VOCs removed from groundwater and enhance the removal of VOCs from soil. This would help in the clean-up of subsurface soil and may meet soil SCGs. As with Alternative 2, SCGs for surface soil would not be universally met due to the fact that some surface soils with non-site related contaminants would remain. Discharge controls on the vapors collected through soil vapor extraction would allow Air SCGs to be met.

Alternative 4 would achieve SCGs to a similar extent as Alternative 3. Shallow groundwater would be stripped of VOCs in the installed wells. Subsurface soil clean-up would be promoted by the recirculation of water around the wells.

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 do nothing to improve conditions at the site. This alternative would not be protective of human health and the environment.

Alternatives 2-4 would be protective of human health and the environment. The only exposure pathway which is currently complete is contact with contaminated surface soils. Each of these remedies would address the two identified areas of surface soil contamination which are thought to be of concern. Shallow groundwater contamination would be addressed in each of these alternatives. Even though this is not a currently complete exposure pathway, it is of future concern. Inhalation of VOCs escaping from contaminated groundwater is also a non-complete pathway which might be of future concern should highly contaminated shallow groundwater migrate to basements or sumps. This too would be addressed by this alternative's treatment of groundwater contamination. No significant environmental exposures or impacts were identified at this site. Potential receptors are extremely limited at the site.

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

3. Short-term Impacts and Effectiveness. 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 has no impacts and effects no change in the condition of the site.

Each of the other alternatives have similar potential for impacts to site workers and workers in the surrounding buildings as a result of surface soil excavation. The excavation of soil has the potential for causing the mobilization of contaminated dust. This could easily be controlled by proper application of engineering controls such as misting or other dust suppression techniques. Alternatives 3 and 4 involve treating groundwater "in place" through either sparging or in well air stripping. Both of these processes liberate VOCs from the subject media. Uncontrolled, either of these could expose those on or near the site to VOCs. Air emission controls can effectively prevent any significant exposures. Alternative 3 calls for vapor extraction which, properly applied, would control the release of such vapors. Alternative 4 would control emissions through the application of a low level vacuum above the water column in the well.

While the length of time each remedy would require to meet the Remedial Action Objectives (RAOs) for groundwater cannot be precisely stated, it is anticipated that Alternative 2 (pump and treat) would require longer to achieve RAOs than Alternatives 3 or 4. Alternatives 3 and 4 both contain a more active approach to removing VOCs from groundwater and would be more rapidly effective.

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 achieve RAOs and has the lowest long-term effectiveness.

The surface soil removal component of Alternatives 2-4 would be permanent. The soil would be taken offsite and disposed of at an appropriate landfill. We anticipate that no site related residuals would remain in surface soil at the site.

The extraction and collection of groundwater proposed in Alternative 2 would be a permanent groundwater remedy. There would be an element of transferring contamination from one

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media or system to another because the water discharged to the POTW would have some concentration of VOCs. Also, with pump and treat technology, there is a significant potential for "rebound" in groundwater contaminant levels once the pumps are shut off. Pump and treat may also leave a slightly higher level of residual contamination in subsurface soil. This would need to be monitored for in order to facilitate appropriate response.

Alternatives 3 and 4 would be permanent remedies which remove contamination from the groundwater. Once these remedies achieve RAOs there should be no residual problems with groundwater. No significant potential exposure pathways would remain once either of these alternatives was completed.

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 would do nothing to reduce toxicity, mobility, or volume of site contamination.

The soil removal component of Alternatives 2, 3, and 4 would eliminate the mobility (leaching potential to groundwater) of contamination in the excavated soils. Landfill disposal would do nothing to reduce toxicity or volume but would eliminate the contact threat posed by this soil.

Alternative 2's groundwater collection system would control the mobility of contaminated groundwater. The volume of contamination would be reduced through the stripping of VOCs from groundwater and the concentration of these in a control media such as carbon. Toxicity would eventually be reduced when the carbon was recycled.

Alternatives 3 and 4 would remove VOC contamination from groundwater and capture it through soil vapor extraction (Alt. 3) or through a vacuum placed on the well (Alt. 4). In either case the VOCs could then be collected by vapor phase carbon. Either alternative would be effective in reducing mobility and volume, and toxicity could be reduced by recycling the carbon.

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 material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc..

There would be no difficulties in "implementing" Alternative 1 since it involves no action.

Alternatives 2, 3, and 4 would all be implementable. Alternative 2 would require treatment and disposal to the POTW of a significant quantity of shallow groundwater. Alternatives 3 and 4 would not extract or handle groundwater. Alternatives 2 and 3 involve well established and readily available technologies and materials. Well installation and pumps, in Alternative 2, and vapor extraction, and sparging, in Alternative 3, are provided by numerous vendors. Alternative 4 relies on a newer process available from fewer vendors. The technology is, however, understood and reliable. One site specific technical concern for Alternative 4 would be the relatively shallow water table in the area behind the site building. This could pose a problem for the reinfiltration of groundwater from the stripping wells. Acquiring POTW discharge permits would be the primary administrative action needed in Alternative 2 and should be easily achievable.

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 effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 2.

This final criterion is considered a modifying criterion and is taken into account 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 RI/FS reports and the Proposed Remedial Action Plan are evaluated. A " Responsiveness Summary" will be prepared that describes public comments received and how the Department will address the concerns raised. If the final remedy selected differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

SECTION 8: SUMMARY OF THE PREFERRED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is proposing **Alternative 3** as the remedy for this site.

This selection is based upon the conclusion that the remedy proposed in Alternative 3 would achieve each of the assessment criteria to the greatest extent feasible.

Alternative 1 was not selected since it did not meet any of the relevant requirements.

Alternatives 3 and 4 are equally likely to achieve SCGs. Alternative 2 has a slightly lower likelihood of achieving groundwater standards in a reasonable time frame though it would control migration of groundwater contamination.

Alternatives 2, 3, and 4 would all be protective of human health and the environment. Each would control or eliminate the exposure pathways at the site.

Alternatives 2, 3, and 4 would all have very limited short-term impacts on the community. Those impacts present would be easily managed. RAOs would be achieved more quickly with Alternatives 3 and 4 than in Alternative 2.

Alternatives 2, 3, and 4 would have about the same level of long-term effectiveness and permanence. They each would involve removal of contamination and not just the isolation of same. Alternative 2 would have the potential to level slightly more residual contamination in the subsurface.

Reductions in toxicity, mobility, and volume would be comparable for Alternatives 2, 3, and 4.

Alternative 2 would be easiest to implement because of the established technology and the fact that it has the fewest elements. Alternative 3 and 4 would have a similar level of technical implementability, with Alternative 4 complicated by some site specific considerations.

Cost of Alternative

The estimated present worth cost to implement the remedy is $478,196. The cost to construct the remedy is estimated to be $182,015 and the estimated average annual operation and maintenance cost for 6 years is $61,000.

The elements of the selected remedy are as follows:

1. 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. Any uncertainties identified during the RI/FS would be resolved.

2. Several air sparging points located in the areas of highest shallow groundwater contamination.

3. Vapor extraction points beneath the site buildings and as needed to collect VOCs released by sparging.

4. Vapor phase treatment system for extracted VOCs.

5. Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program would be instituted. This program would allow the effectiveness of the selected remedy to be monitored and would be a component of the operation and maintenance for the site.

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
No Action	$0	$12,000	$77,900
Alternative 2 - Pump and Treat	$185,864	$87,600	$824,386
Alternative 3 - Air Sparging	$182,015	$61,000	$478,196
Alternative 4 - In-well Air Stripping	$414,064	$61,000	$738,163