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ENARC-O MACHINE PRODUCTS, INC. SITE

Lima (T), Livingston County, New York
Site No. 8-26-011

PROPOSED REMEDIAL ACTION PLAN

June 1997

Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

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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 combination of actions to address the contamination at the Enarc-O Machine Products site. The remedy involves:

- Excavation and disposal of shallow, contaminated courtyard area soil;
- Separation/treatment of contaminants via low vacuum vapor extraction from soils remaining in place; and
- Control/Isolation via a low-permeability cap for soil remaining in place.

This remedy is proposed to address the threat to human health and the environment created by the presence of volatile organic compounds in site soil and groundwater.

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 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:

NYSDEC
50 Wolf Road - Rm 348
Albany, New York 12233-7010
Michael J. Ryan, P.E.
Project Manager
(518) 457-4343
hours: 8:00-4:15, Mon.-Fri.

Mendon Public Library
15 Monroe Street
Honeoye Falls, New York
(716) 624-6067

hours: 10:00-9:00, Mon.
2:00-9:00, Tues.&Wed.
10-12:00, 2-9:00, Thurs.
2:00-5:00, Fri.
1:00-4:00, Sat.

Written comments on the PRAP can be submitted to Mr. Ryan, Project Manager, at the above address.

DATES TO REMEMBER:

June 30, 1997 - July 31, 1997: Public comment period on RI/FS Report, PRAP, and preferred alternative.

June 16, 1997 at 7:00 pm - 9:00 pm: Public meeting at Lima Town Hall,7329 East Main Street, Lima, New York

SECTION 2: SITE LOCATION AND DESCRIPTION

The Enarc-O Machine Products, Inc. site is an active industrial facility located at 1175 Bragg Street in the Town of Lima, Livingston County, New York. (ref. Figure 1). The site is approximately six acres in size. Enarc-O Machine Products has been operating at this location since 1960. The facility is comprised of one main manufacturing building located in the northern portion of the property and a smaller, storage building located southeast of the main building (ref. Figure 2). There is an asphalt access driveway with gravel parking/loading area. The remainder of the site is covered by a grassy lawn.

The site is bounded on the north and west by residential property and to the east by residential property and Honeoye Creek. The site is bounded to the south by an automobile repair/bodywork shop, residential property and farmland.

The topography in the immediate vicinity of the site is generally flat to the south and west, but slopes off relatively steeply to the east, toward Honeoye Creek.

SECTION 3: SITE HISTORY

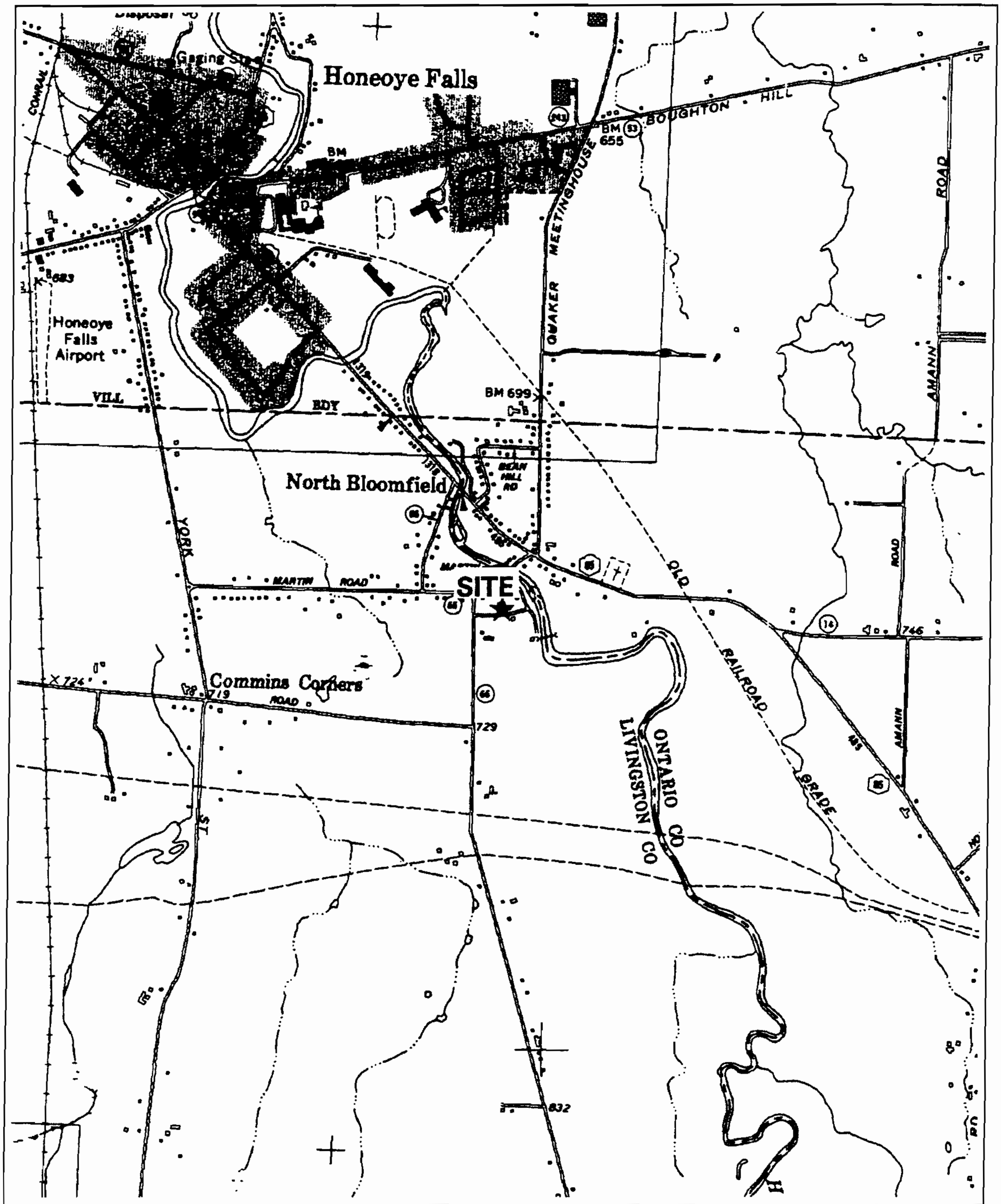
3.1: Operational/Disposal History

Enarc-O Machine Products manufacturing operations began in a nearby residence in 1954 and in 1960 the manufacturing operation moved to the current location. Kaddis Manufacturing purchased Enarc-O Machine Products in 1984.

Site manufacturing activities include machining and shaping of small metal parts, followed by a deburring process. Solvent use at the site was limited to a degreasing process which removed oil residues from newly-machined parts. Trichloroethene (TCE) was used in this process until 1980, and 1,1,1-trichloroethane (1,1,1-TCA) between 1980 and 1985. The use of chlorinated solvents in degreasing operations was discontinued in 1985.

Former and current degreasing operations have been performed on the south side of the east wing of the main building (see Figure 2). One degreaser was located on a metal grate over a concrete vault which is depressed approximately 2 ft. ± below slab grade. Two above-ground tanks were situated on the east side of the production building, south of the degreaser area. Used cutting oil was stored in one tank and TCA was stored in the other. Both of the above-ground tanks, as well as an onsite underground gasoline storage tank, were removed in July 1986.

In 1984, elevated levels of VOCs were detected in the onsite supply well. This prompted residential well sampling in 1985. Results indicated contamination in 21 nearby residential wells. Over 30 surrounding residences were subsequently provided bottled water. In 1988, a



Site Location Map

826011 Enarc-O Machine Products, Inc.

NYSDOT Planimetric Quadrangle(s):

0 500 1000 1500 2000

FEET

N

Scale 1:24,000

March 23, 1996

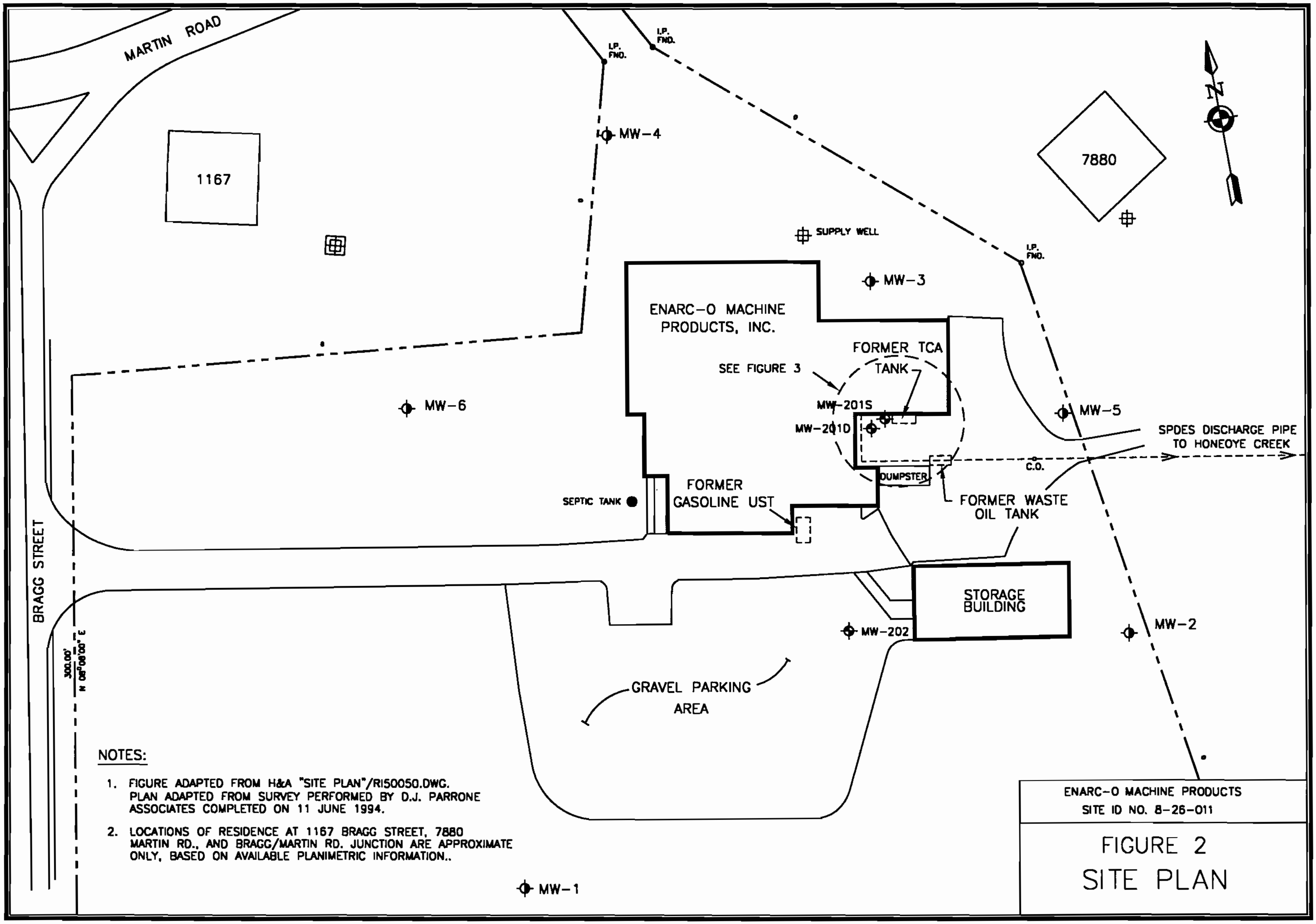


FIGURE 2
SITE PLAN

public water supply was installed for the affected area.

In 1991, a Site Assessment was conducted at the site and in 1994 an RI was initiated. Based on the results of the RI, the apparent contaminant source area is beneath the floor slab in the vicinity of the degreaser and in the vicinity of the former above-ground storage tanks, south of the degreaser area.

3.2: Remedial History

1984 - Livingston County Health Department (LCHD) found elevated levels of volatile organic compounds (VOCs), specifically the chlorinated solvents TCE and 1,1,1-TCA, in the Enarc-O supply well.

1985- NYSDEC, NYSDOH and LCHD sampled 38 private residential wells and found 21 to be contaminated with varying levels of chlorinated solvents.

1985 - NYSDEC requested the assistance of the United States Environmental Protection Agency (USEPA) to mitigate the affects of groundwater contamination on area residents. The USEPA provided bottled water to over 30 area residences.

1987 - Enarc-O Machine Products was listed on the NYS Registry of Inactive Hazardous Waste Disposal Sites.

1988 - The installation of a public water supply as an interim remedial measure (IRM) to the affected area was completed. The installation of the public water supply was funded by Kaddis Manufacturing.

1991 - A Site Assessment was performed and a report issued by Kaddis Manufacturing. The site assessment addressed onsite soil and groundwater contamination. Results indicated the presence of VOCs in both soil and groundwater.

March 1994 - Kaddis Manufacturing entered a Consent Order for the Remedial Investigation/Feasibility Study (RI/FS) of the site.

September 1996 -The NYSDEC approved the RI Report.

June 1997 - The NYSDEC approved the FS Report.

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/or the environment, Kaddis Manufacturing 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. A report entitled *Report on Remedial Investigation, Enarc-O Machine Products, January 1996 (Revised August 1996)* has been prepared describing the field activities and findings of the RI in detail.

The RI included the following activities:

- Residential well field evaluation - Residential wells were evaluated to determine the feasibility of using these wells in the offsite residential well sampling program.

- Soil vapor survey - An onsite soil vapor survey was conducted to better define the limits of soil contamination by VOCs.

- Onsite well installation - Three additional wells were installed on the site, for a total of nine.

- Stream staff gauge installation - A staff gauge was installed along the Honeoye Creek stream bed to provide a surveyed reference point of known elevation from which to measure stream water levels.

- Borehole geophysical logging - Borehole geophysical logging was conducted on four offsite residential wells and the Enarc-O supply well.

- Well sampling - Groundwater samples were collected from both onsite wells and offsite residential wells. In addition, groundwater level elevations were measured at the time of sampling.

- Off-site surface soil sampling - Four offsite surface soil samples were collected in order to help evaluate human exposure pathway routes of exposure.

- Septic tank sampling - The site's septic tank was sampled to determine if VOCs were disposed through the septic system.

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 Enarc-O 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).

4.1.1 Nature of Contamination:

As described in the RI Report, soil, groundwater and soil vapor samples were collected at the Site to characterize the nature and extent of contamination. Based on the results of the sampling program, chlorinated VOCs are the predominant contaminants of concern (COCs). The COCs are as follows:

- trichloroethene (TCE)
- 1,1,1-trichloroethane (TCA)
- 1,1-dichloroethene (1,1-DCE)
- 1,2-dichloroethene (1,2-DCE) total
- perchloroethene (PCE)

4.1.2 Extent of Contamination

Table 1 summarizes the extent of contamination for the contaminants of concern in groundwater and compares the data with proposed remedial action levels (SCGs) for the Site. The following are the media which were investigated and a summary of the findings of the investigation.

Groundwater

The groundwater investigation conducted as part of the RI involved sampling of both onsite and offsite wells. All of the wells sampled as part of the RI are bedrock wells as an overburden aquifer was not encountered. Bedrock at the site is situated approximately 12-15 feet below the ground surface. Eleven former residential supply wells were sampled as part of the RI, as well as the former Enarc-O supply well and the sump in the basement of a nearby residence. Each of these wells was sampled at two depths, with the exception of the Enarc-O supply well and the well at 7880 Martin Road, which were sampled at three depths. Seven of the eleven former residential wells were sampled in both April and August of 1995 to allow a seasonal comparison of data. For all the onsite monitoring wells, RI groundwater monitoring was conducted for four quarterly events, beginning in July of 1994.

The data from the offsite wells indicates that in nearly all of the former residential wells, VOCs have decreased in concentration significantly since 1985. In a number of instances no VOCs were detected. VOC concentrations in six of the eleven wells sampled were below NYS groundwater standards, generally those situated furthest from the Enarc-O site. VOCs also dropped significantly in wells nearer the site, although select compounds were detected at levels above NYS groundwater standards. No discernible pattern was observed with respect to vertical distribution of contaminants.

The quarterly sampling of onsite wells during the RI revealed that the principal compound present is TCE, with lesser levels of 1,1,1-TCA, cis-1,2-DCE and PCE. Groundwater VOC concentrations are highest in well MW-201D, which is situated in the vicinity of the former above-ground storage tanks. This area is referred to as the "courtyard" (see Figure 3). In August 1995, TCE was observed at a concentration of 7,700 ppb. The August sampling program also showed TCE concentrations of 120 ppb, 510 ppb and 540 ppb in wells MW-2, MW-3 and MW-5, respectively.

A comparison of the RI sample data to 1991 sample data shows that the contaminants in onsite monitoring wells, while above NYS standards, have generally diminished in concentration. Only well MW-5 did not show a significant decrease. Evaluation of the recent and historical groundwater data (offsite and onsite) supports the conclusion that continued significant migration of VOCs from the site is not occurring.

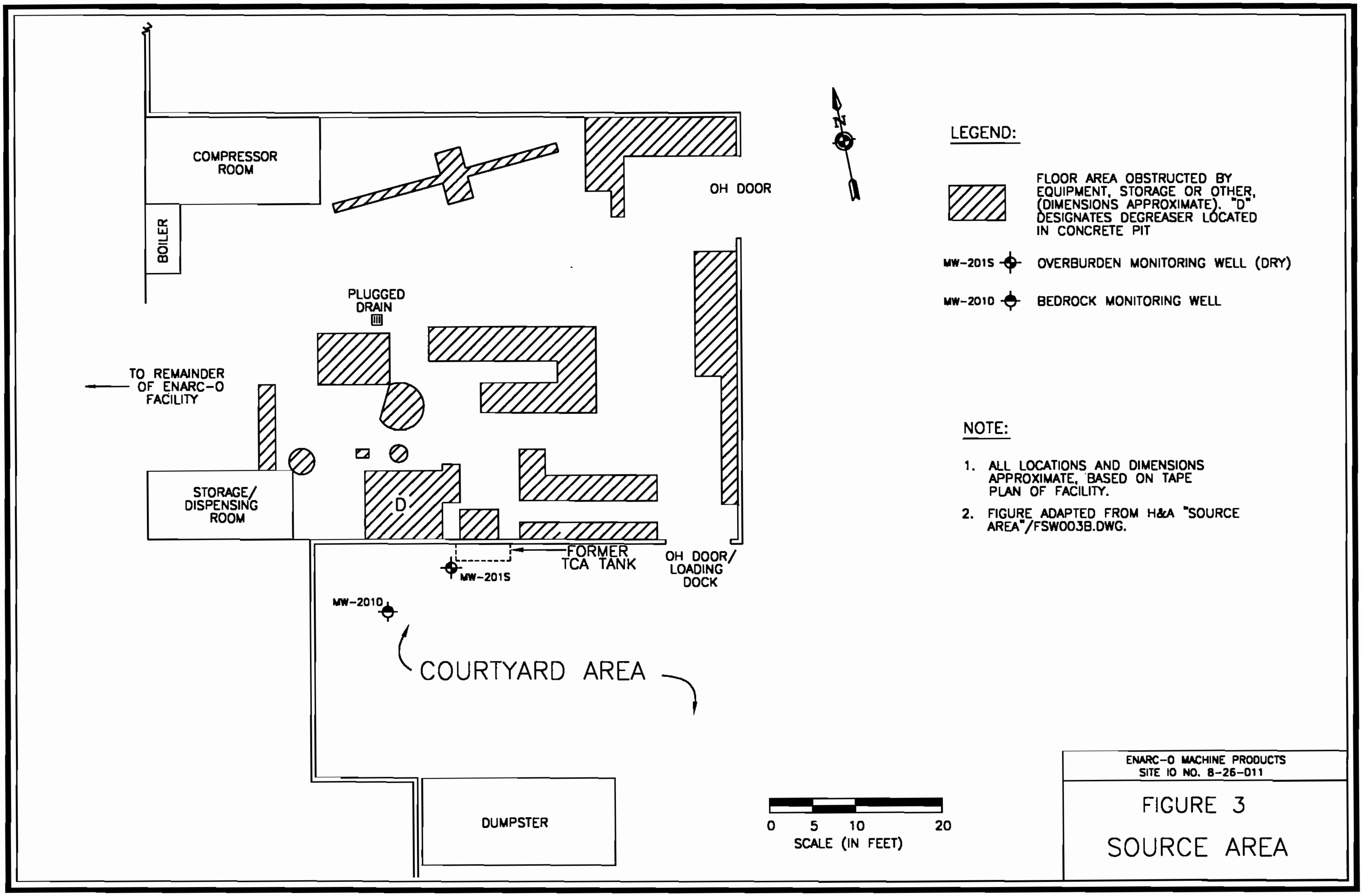
Soil

While relatively few soil samples were collected as part of the RI, the site was subject to a comprehensive soil vapor investigation. The findings of the soil vapor study revealed that contaminants in soil are generally concentrated in a limited area in the vicinity of the former degreaser and courtyard area. Maximum VOC values of 345 ppm and 387 ppm in soil vapor samples were detected inside the building and outside the building near the former TCA tank, respectively. Within the courtyard, volatiles are present in an irregular pattern with respect to depth and distance from the degreaser location. The levels of volatile compounds detected in soil vapor in the courtyard and former degreaser area are indicative of a source area at shallow depths within these areas.

Soil vapor concentrations away from the building and courtyard area are limited to low part per million concentrations in the vicinity of a former underground gasoline tank and very low ppm concentrations around the Enarc-O Storage Building and courtyard perimeter. The findings of the soil vapor study, therefore, support that a source area exists in the subsurface soils and that the source area is generally confined to the courtyard and adjacent location beneath the building, near the former degreaser area. Further, the findings of the RI support the conclusion that this source area has been and continues to act as a continuing source of contamination to the underlying aquifer.

4.3 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 RI Report.


COMPRESSOR ROOM
BOILER
OH DOOR
N
LEGEND:
FLOOR AREA OBSTRUCTED BY EQUIPMENT, STORAGE OR OTHER, (DIMENSIONS APPROXIMATE). "D" DESIGNATES DEGREASER LOCATED IN CONCRETE PIT
MW-201S OVERBURDEN MONITORING WELL (DRY)
MW-201D BEDROCK MONITORING WELL
PLUGGED DRAIN
TO REMAINDER OF ENARC-O FACILITY
NOTE:
1. ALL LOCATIONS AND DIMENSIONS APPROXIMATE, BASED ON TAPE PLAN OF FACILITY.
2. FIGURE ADAPTED FROM H&A "SOURCE AREA"/FSW003B.DWG.
STORAGE/ DISPENSING ROOM
D
FORMER TCA TANK
MW-201S
OH DOOR/ LOADING DOCK
MW-201D
COURTYARD AREA
DUMPSTER
0 5 10 20
SCALE (IN FEET)
ENARC-O MACHINE PRODUCTS
SITE ID NO. 8-26-011
FIGURE 3
SOURCE AREA

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.

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

- Inhalation of ambient air by current onsite workers indoors.
- Incidental ingestion of site soils by current onsite workers.
- Inhalation of soil particles during excavation activities by future onsite workers.
- Potential exposure to groundwater by offsite residents.

4.4 Summary of Environmental Exposure Pathways:

This section summarizes the types of environmental exposures which may be presented by 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. The following pathway for environmental exposure has been identified:

- Potential contact or ingestion of shallow bedrock groundwater which discharges to the surface in nearby low-lying areas.

SECTION 5: ENFORCEMENT STATUS

The NYSDEC and Kaddis Manufacturing entered into a Consent Order on March 22, 1994. The Order obligated the responsible parties to implement a Remedial Investigation/Feasibility Study program. Upon issuance of the Record of Decision the NYSDEC will approach the PRPs to implement the selected remedy under an Order on Consent.

The RI/FS consent order is referenced as follows: Index No. B8-0112-91-04.

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:

- Reduce, eliminate or control, to the extent practicable, the contamination present within the soils on site;
- Reduce, eliminate or control, to the extent practicable, the potential for migration of contaminants to groundwater beneath the site source area;
- Mitigate the impacts of contaminated groundwater to the environment;

- Provide for attainment of SCGs for groundwater quality, to the extent possible; and

- Eliminate the potential for direct human or animal contact with the contaminated soils on site.

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 other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Enarc-O Machine Products site were identified, screened and evaluated in a Feasibility Study. This evaluation is presented in the report entitled *Report on Feasibility Study, Enarc-O Machine Products, May 1997.*

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

As discussed in Section 4, the RI concluded that the source area is generally confined to the soils beneath the manufacturing building, in the vicinity of the former degreaser, and to the courtyard area. The RI further suggests that the contaminant distribution in groundwater is limited primarily to bedrock beneath the source area. Recent and historical sampling of onsite and offsite groundwater indicate the contaminant levels have diminished through attenuation to levels at or below the applicable groundwater standards, except in, or very near to the source area. Under natural conditions at the Enarc-O site, the VOC concentrations in the groundwater are expected to continue diminishing over time due to natural degradation and attenuation; however, this process would be enhanced if source area soils were to undergo removal or in-situ remediation, thereby reducing the contaminant mass available to migrate to groundwater.

The FS evaluated recovery and treatment of groundwater (i.e. a "pump-and-treat" option). Citing the potential limited effectiveness of such a system in the fractured bedrock setting (specifically the high permeability and yield potential of the underlying aquifer), and the recent and historical sampling of onsite and offsite groundwater, the FS concluded that groundwater treatment was not a viable option. Rather, the FS supports addressing the source of contamination, thus enhancing/accelerating the attenuation of contamination which is already occurring. Accordingly, the response actions discussed below include various alternatives to address the identified source of contamination (i.e. the contaminated soils).

Alternative 1
No Action

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.

Alternative 2
On-Site Control/Isolation without Treatment

Present Worth:	$ 84,000
Capital Cost:	$ 15,000
Annual O&M:	$ 8,500
Time to Implement	6 months - 1 year

Under this alternative, the soils in the courtyard area would be isolated by installing a low-permeability cover of asphalt or other material that would prevent: 1) further infiltration of surface water and run-on; 2) human contact with soils; and 3) generation of contaminated soil dust that could potentially be ingested by site workers. The soils located beneath the existing building are currently isolated by virtue of being covered by the floor slab and foundation wall.

In addition to the low-permeability cap, additional measures would be taken to further reduce infiltration. An existing roof drain currently diverts roof rainwater to the courtyard area, increasing the volume of infiltrating surface water and therefore potential contaminant transport. Elimination of this run-on would be performed by reconfiguring the roof drain piping. This would be a permanent, partial remedy that would have immediate benefit.

If future expansion of the existing facility were warranted, it would involve structure expansion to the courtyard area. Such construction would not preclude the control/isolation response action, and would potentially be a more effective barrier to infiltration than a cap. Construction of an occupied space may necessitate installation of measures to prevent VOC vapors from entering the structure. This would include such measures as a vapor barrier and/or sub-slab venting.

This alternative would also include long-term groundwater monitoring to document groundwater quality and detect any migration of COCs at concentrations in excess of the NYSDEC groundwater quality standards.

Alternative 3
Excavation and Offsite Disposal without Treatment

Present Worth:	$ 126,000
Capital Cost:	$ 58,000
Annual O&M:	$ 8,500
Time to Implement	6 months - 1 year

This alternative would involve removing soils by excavation from the identified source area and disposing of the materials at an off-site facility permitted to handle such wastes. Approximately 375 tons of contaminated soil would be removed from the courtyard area, in an excavation 4± ft. deep. The 4-ft. depth limit is based on the presumed depth of the existing building footings. Excavating deeper than these footings would potentially cause structural instability or damage due to settlement. Soils below this depth, therefore, would be left in place as would all contaminated soils beneath the building.

Excavation and disposal would be performed in accordance with applicable regulations. Since the waste soil contains VOCs, a determination would be required from NYSDEC with regard to the waste being potentially classified as either hazardous or solid waste. NYSDEC TAGM 3028 allows for waste soil with relatively low levels of normally hazardous VOC compounds to be handled and disposed as solid waste.

In October 1996 the PRP initiated an investigation to determine the levels of VOCs in the site's source area soils and to identify the portion(s) that could be excavated and disposed. Based on the results of the investigation, the soil would be disposed as a solid waste at a permitted disposal facility.

This alternative would also include long-term groundwater monitoring to document groundwater quality and detect any migration of COCs at concentrations in excess of the NYSDEC groundwater quality standards.

Alternatives 4A and 4B
In-situ Soil Vapor Extraction

In-situ separation of contaminants from unsaturated soil is generally accomplished through soil vapor extraction which was evaluated in two modes by the FS: 1) high-vacuum extraction using vacuum blowers to apply moderate to high vacuum to the vadose zone soils, to achieve a high VOC extraction rate; or 2) low vacuum, which doesn't produce VOC yield as rapid as high-vacuum extraction, but can be effective and have low maintenance over the long term.

Alternative 4A
Low Vacuum Soil Vapor Extraction

Present Worth:	$ 104,000
Capital Cost:	$ 21,000
Annual O&M:	$ 10,000
Time to Implement	6 months - 1 year

Separation of contaminants from unsaturated soil would be accomplished through soil vapor extraction (SVE) performed utilizing a low vacuum system which employs wind-powered turbines to produce a vacuum on soil. Applications of this type of vacuum system are common in petroleum release remediation. The conceptual low vacuum SVE design would entail installation of two angled wells through the building foundation wall to access the contaminated soils beneath the building. Vertical extraction wells, or trenched, horizontal, slotted pipe would be installed within the courtyard area. These wells would be manifolded together and connected to riser pipes which extend above the roof line with wind-driven turbine ventilators attached to each. All wells and piping would be 4-in. PVC with appropriate fittings.

The conceptual turbine has an 8-in. throat and a rated exhaust capacity of 256 cubic feet per minute (cfm) at a wind speed of 4 mph. The vacuum extraction system would employ multiple turbines, each on a vertical section connected to either a well or buried horizontal pipe run.

Often SVE systems require that the extracted vapor be treated at the surface using granular activated carbon (GAC) or other methods which strip the extracted vapor of VOCs. The treated vapor is then discharged to the air. The rates of vapor from a low vacuum system, however, would likely be at levels low enough that exceedence of air discharge permit levels would not occur. Accordingly, vapor treatment for the wind-powered system may not be required.

To monitor ongoing operation of the SVE and the mass of contaminants removed, measurement of vapor effluent contaminant concentrations would be performed on a regular basis. This alternative would also include long-term groundwater monitoring to document groundwater quality and detect any migration of COCs at concentrations in excess of the NYSDEC groundwater quality standards.

Alternative 4B
High Vacuum Soil Vapor Extraction

Present Worth:	$ 410,000
Capital Cost:	$ 78,000
Annual O&M:	$ 41,000
Time to Implement	6 months - 1 year

This type of system would be very similar to that described in Alternative 4A but would employ an electric motor/blower to produce a vacuum on soil, in lieu of wind-powered turbines.

This Alternative is considerably more costly than Alternative 4A in light of the operation and maintenance requirements, including the provision for air treatment. The extracted vapor from the system would likely require treatment at the surface using granular activated carbon (GAC) or other methods which strip the extracted vapor of VOCs, in light of the higher extraction rate. The treated vapor would then be discharged to the air via a stack or stacks above the roof line.

To monitor ongoing operation of the SVE and the mass of contaminants removed, measurement of vapor effluent contaminant concentrations would be performed on a regular basis. This alternative would also include long-term groundwater monitoring to document groundwater quality and detect any migration of COCs at concentrations in excess of the NYSDEC groundwater quality standards.

Alternative 5
Remedial Action Combination:
Control/Isolation, Excavation/Disposal, and Soil Vapor Extraction

Present Worth:	$ 180,000
Capital Cost:	$ 97,000
Annual O&M:	$ 10,000
Time to Implement	6 months - 1 year

This alternative would involve the implementation of several of the above actions in combination with the others. The combination proposed includes: 1) excavation and disposal of courtyard soils as solid waste; 2) control/isolation by covering the courtyard with a low-permeability cap; and 3) separation/treatment using vapor extraction for soils left in place (courtyard area and beneath the building).

Since inception of the response to the contaminant release at the site, an alternate source of drinking water has been provided to the area, the 1,1,1- TCA tank has been removed, and several phases of investigation and sampling have been performed. Since these actions, the overall groundwater quality has increased through natural processes. Excavation of courtyard soils, especially if combined with capping of the courtyard, would remove the primary portion of the source area soils that contributes to contamination in groundwater. This is because the courtyard has been subject to infiltration and roof run-on, which has allowed contaminant leaching and downward migration.

For the source area soils left in place, a vapor extraction system would provide a viable means of further reducing potential contaminant migration in a setting that has already been demonstrated to have shown marked improvement without the presence of a mechanism for VOC removal.

Although a wind-powered system would not accomplish contaminant separation at a rate comparable to a blower-powered system, it would provide for ongoing reduction in the contaminant mass at a fraction of the cost of a higher-vacuum system. The rates of vapor, and therefore contaminant extraction, would likely be at levels low enough that exceedence of air discharge permit levels would not occur. Thus, vapor treatment would not be required. Further, operation and maintenance efforts for a low-vacuum system would also be relatively minor.

In light of the incremental benefit realized by using the more costly blower-powered system, when utilized in conjunction with Alternatives 2 and 3, a low vacuum system is a more viable alternative. The individual components of this remedial action, therefore, would be as described above in Alternative Nos. 2, 3 and 4A. However, the SVE system in the courtyard area would be installed at the base of the courtyard area excavation. Two alignments of horizontal slotted screen pipe would be installed within the bottom of the excavation created by the courtyard soil removal and manifolded to riser pipes which extend above the building roof line. Like the extraction pipes beneath the building, a wind-driven turbine/ventilator would be connected to each pipe for a total of four.

A monitoring program would be implemented consistent with that described in Alternative 4A.

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.

All of the remedial alternatives would be designed and implemented to meet action-specific SCGs, however, the no action alternative includes no measures to address contravention of pertinent standards. Alternatives 2 and 3 each provide a limited action which, alone, may not fully meet SCGs. Alternative 4A, the low vacuum vapor extraction system, would ultimately comply with pertinent SCGs, though the time frame associated with compliance is uncertain. Alternative 4B would likely comply with pertinent SCGs sooner than Alternative 4A, in light of the higher extraction rate. Alternative 5, the combination of actions, would meet the SCGs.

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

The health risk assessment conducted during the RI indicated that existing contaminant levels do not create unacceptable risks to humans. All of the alternatives would provide for a reduction in the concentrations of COCs present, thus reducing the risk to the environment, though no action relies exclusively on natural attenuation. Natural attenuation would take many years and could pose increased risks to public health and the environment with increased contaminant leaching and/or migration. Alternatives 2, 3, 4A and 4B would each provide additional protection to the environment, based on their limited actions. Alternative 5 would rate highest with regard to protection of the environment by removing contaminated soil and containing and treating the areas of contamination which would remain.

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

3. Short-term 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.

All of the alternatives, except the no action alternative, would involve some degree of construction within the source area. Alternative Nos. 3 and 5, because of the required excavation activities, would be more extensive and present a higher potential for short-term risks to on-site workers and the community during implementation. For these alternatives, a greater degree of mitigative measures would need to be implemented to control potential short-term environmental impacts associated with dust and volatilization of the COCs.

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.

The no action alternative would not meet the RAOs for the site. Alternative 2, the control/isolation alternative, would help prevent future migration of contaminants to groundwater but by itself, the alternative would not address the presence of contaminants in soil. Alternative 3, the excavation/disposal alternative would represent an immediate reduction in the source area contaminant mass, but some waste would remain onsite. Alternatives 4A and 4B would both rate well with regard to long-term effectiveness, although the time frame associated with the remedial action for 4A would be longer and, therefore, more uncertain than Alternative 4B. Alternative 5 would rate highest with regard to long-term effectiveness by achieving each of the site RAOs.

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.

The no action alternative would not satisfy this criteria. Alternative 2 would reduce the mobility of contaminants by reducing infiltration. Toxicity and volume, however, would not be affected. Alternative 3 would reduce the volume of contamination present, however, as this alternative only addresses one area of contamination (i.e. the courtyard), the toxicity and mobility potential of the remaining areas would not be affected. Alternatives 4A and 4B would allow for a reduction in the contaminant mass and toxicity but the mobility would not be significantly affected. Of the alternatives, Alternative 5 would rate the highest by reducing both the volume and mobility of the contaminants.

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.

All of the remedial alternatives would be technically feasible and could be implemented at the site. Alternative 1, the no action alternative, and Alternative 2 would rate high with regard to implementability. Each involves straightforward measures. Alternative 3 would require a greater degree of coordination, in light of the required excavation, transport and disposal of contaminated soils. Alternative 5 would also require a high degree of coordination, as three individual actions would be implemented simultaneously: excavation, containment and treatment. Alternative 4B would require the highest degree of coordination in light of the NYSDEC Division of Air involvement, as well as engineering considerations for the system design, placement, operation and maintenance.

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 5, the Remedial Action Combination: Control/Isolation, Excavation/ Disposal, and Soil Vapor Extraction** as the remedy for this site.

This selection is based upon the evaluation in the Feasibility Study. The Feasibility Study supports that the alternative which combines these various actions would be the most beneficial remedial action plan for the site. When considered together, the actions would provide an effective and implementable approach to achieving the program's goals. Alternative 5 would provide a combination of methodologies that would achieve the RAOs for the site while generally satisfying the criteria by which the various methods have been evaluated. The combination also represents a cost-effective approach that would be implemented without undue technical or administrative impediments.

The estimated present worth cost to implement the remedy would be $180,000. The cost to construct the remedy is estimated to be $97,000 and the estimated average annual operation and maintenance cost for ten years would be $10,000.

The elements of the proposed 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. Excavation and offsite disposal of approximately 375 tons of accessible, affected soil from the courtyard to a permitted, solid waste management facility.

3. Installation of a soil vapor extraction piping and well network beneath the excavated area and existing building, and connection of this network to vertical wind-powered turbine exhaust units.

4. Backfill of the courtyard area, diversion of roof drain run-on and capping with a low-permeability asphalt cap. If feasible to the site owner, building expansion construction over the courtyard would be an acceptable and potentially preferable alternative to asphalt capping.

5. Since the remedy results in untreated hazardous waste remaining at the site, an SVE and groundwater monitoring program would be instituted. This semi-annual sample collection and analysis 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. As an additional component of the remedy, monthly VOC vapor monitoring of the turbines would be conducted using a direct reading instrument.

6. As a component of the design, performance criteria will be established to verify the effectiveness of the remedy. The criteria will be used to gauge the system's progress toward attainment of remedial goals and to upgrade and/or modify the system, if necessary.

Table 1
Nature and Extent of Contamination

MEDIA	CLASS	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY of EXCEEDING SCGs	SCG (ppb)
Groundwater	Volatile Organic Compounds (VOCs)	Trichloroethylene	ND to 7,700	39 of 66	5
		1,1,1-TCA	ND to 660	18 of 66	5
		1,2 DCE	ND to 1,500	26 of 66	5
		PCE	ND to 160J	10 of 66	5
		1,1-DCE	ND to 12	4 of 66	5
		1,2-DCA	ND to 11	1 of 66	5
		1,1-DCA	ND to 34	2 of 66	5
		Methylene Chloride	ND to 13J	1 of 66	5
		Chloroform	ND to 8J	1 of 66	7
		Acetone	ND to 180J	2 of 66	50(G)
		Vinyl Chloride	ND to 7J	1 of 66	2
		Benzene	ND to 2J	2 of 66	.7

(G) - Value listed is a guidance value

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
No Action	$0	$0	$0
On-Site Control/Isolation without Treatment	$15,000	$8,500	$84,000
Excavation and Off-Site Disposal without Treatment	$58,000	$8,500	$126,000
Low Vacuum Soil Vapor Extraction	$21,000	$10,000	$104,000
High Vacuum Soil Vapor Extraction	$ 78,000	$ 41,000	$ 410,000
Remedial Action Combination: Control/Isolation, Excavation/ Disposal, Soil Vapor Extraction	$97,000	$10,000	$180,000