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Parker Pen USA Limited

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REMEDIAL & ENFORCEMENT
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25 September 1989

Mr. Patrick McCutcheon
State of Wisconsin
Department of Natural Resources
Southern District Headquarters
3911 Fish Hatchery Road
Fitchburg, WI 53711

Dear Mr. McCutcheon:

Enclosed are three (3) copies of our "Evaluation of Remedial Alternatives" report prepared by our consultant, RMT, Inc.

If you have any questions, please call me at (608) 755-7585.

Regards,

John Houseman

John Houseman
Manager Plant Engineering

JH/caf

cc: Mr. Daniel Cozza
U.S. EPA (with attachments)

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EVALUATION OF REMEDIAL ALTERNATIVES

PARKER PEN USA, LIMITED
JANESVILLE, WISCONSIN

SEPTEMBER 1989

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1. INTRODUCTION

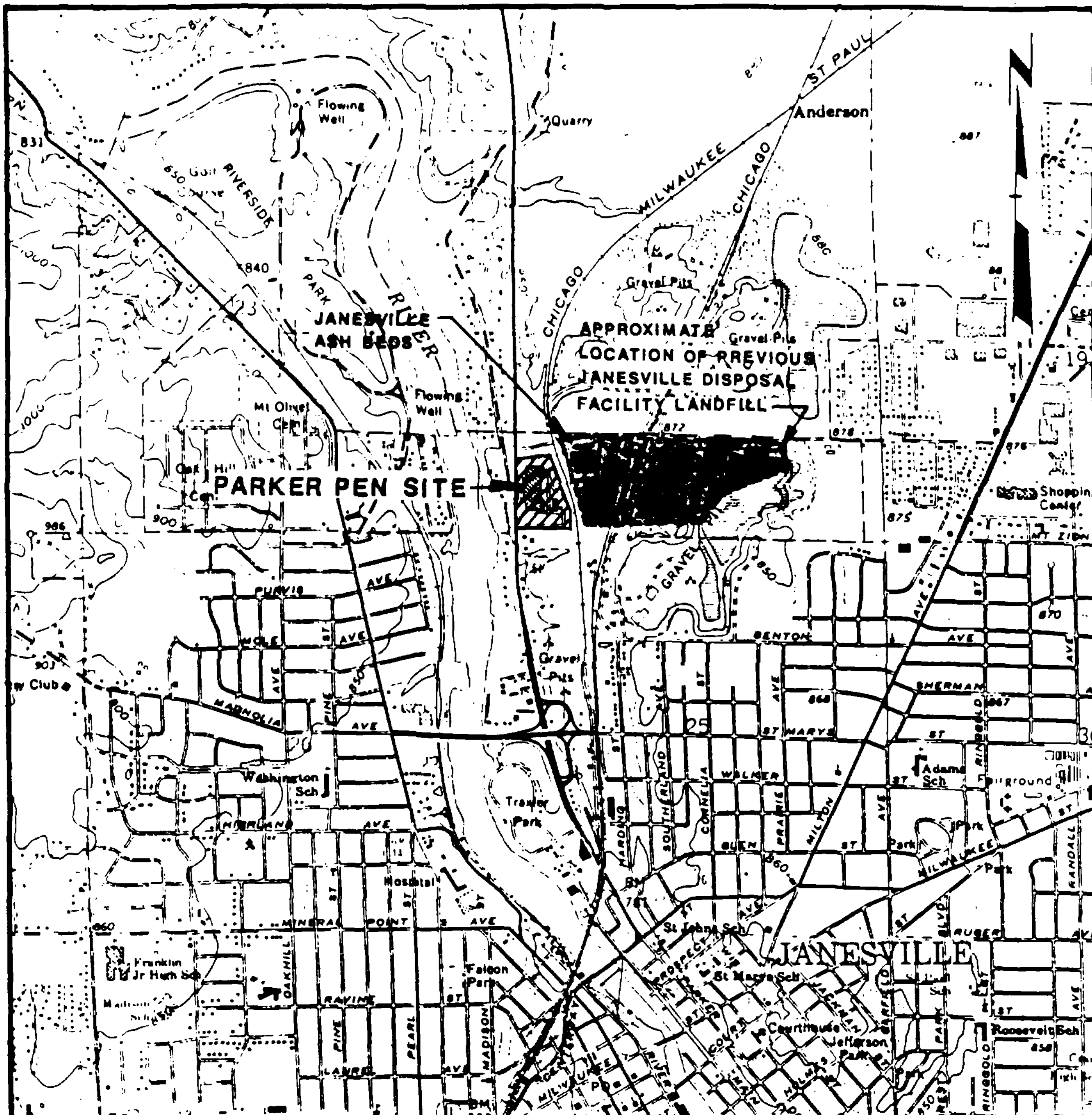
1.1 Background

Parker Pen USA, Limited (Parker Pen), and its predecessor, (the Parker Pen Company) have owned and operated a pen manufacturing facility at 1400 North Parker Drive, Janesville, Wisconsin (SW 1/4 of the SW 1/4 of Section 24, T3N, R12E, Rock County) since 1953 (Figure 1-1).

The Parker Pen facility is located near the Janesville Disposal Facilities (JDF) landfills, owned and formerly operated by the City of Janesville. The JDF consists of four inactive waste disposal sites located next to each other, two of which have been designated as a Superfund site. The remaining two are regulated under the Resource Conservation and Recovery Act (RCRA). The JDF has been the subject of a Remedial Investigation and Feasibility Study (RI/FS) under CERCLA.

One of the inactive landfill areas designated as a Superfund site is the Janesville Ash Beds (JAB), located adjacent to and northeast of the Parker Pen property (Figure 1-1). Operated from 1974 to 1985, industrial liquids and sludge were disposed of and allowed to evaporate or dry within the JAB. The last operating beds were closed in 1985 by removing the waste and underlying soils. According to the draft RI study (Warzyn, 1989), ground water samples collected from wells downgradient of the JAB contain greater than 100 μg/L total chlorinated ethylene compounds. This ground water then flows beneath the northern quarter of the Parker Pen property. A plume containing chlorinated ethylene compounds extends at least 800 feet downgradient of JAB.

In the RI study of the JDF, ground water sampled during April 18-20, 1988, from wells W-20 and W-20A downgradient from the Parker Pen



SITE LOCATION MAP

SCALE 1" = 2000'

1. SITE LOCATION MAP FROM 7.5 MIN. USGS QUADRANGLE MAP JANESVILLE WEST, WISCONSIN.
2. APPROXIMATE LOCATION OF FORMER LANDFILL AREAS FROM DRAFT RI REPORT (WARZYN 1989).

RMT INC

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FIGURE 1-1

facility, contained TCE concentrations of 56,000 and 6,800 μg/L, respectively. These concentrations were much higher than those measured directly downgradient of the JAB (up to 840 μg/L at well W-28).

In the RI (Warzyn, 1989), TCE (up to 1,300 μg/L) was also observed in ground water samples obtained from well W-6, which is located downgradient of the JAB and Parker Pen, during April 18-20, 1988. According to the RI, the TCE in well W-6 may be related to operations at Parker Pen.

The TCE observed in ground water from well W-20 on the Parker Pen property was suspected to be related to an accidental release of TCE from an above-ground tank at Parker Pen, which occurred in February, 1985. The volume of TCE released in the accidental spill was estimated to be 500 gallons, based on inventory and usage records. The WDNR was notified by Parker Pen within approximately three hours of detection of the release. Remediation efforts, conducted one day after the spill by Mr. Frank, Inc., involved the removal and proper disposal of TCE-contaminated snow, soil, and a plastic liner from beneath the TCE storage tank. At the time, it was believed that recovery was complete. The remediation effort was observed and documented by RMT.

Other constituents were identified at high concentrations in wells near the Parker Pen facility during the RI study. Chromium was observed in ground water samples obtained from well W-20 during April 18-20, 1988, at concentrations up to 7,970 μg/L. Chromium was detected in only one other well in the RI investigation (5.1 μg/L in well W-6B) located downgradient of the JAB and Parker Pen. The chromium observed in ground water samples from well W-20, and possibly from well W-6, was suspected to be related to the use of boiling chromic acid in the former chromic acid etching and chrome plating departments previously located on the southern end of the Parker Pen building. Evidence of staining along the southern wall of the building indicated chromic acid may have leaked from the first floor along the wall into the basement and into a trough in the floor which led to the sanitary sewer.

In November 1988, Parker Pen agreed with USEPA, the Wisconsin Department of Natural Resources (WDNR), and representatives of the Potentially Responsible Parties (PRPs) for the JDF (including Parker Pen), to investigate the source and extent of TCE and chromium in the ground water near the Parker Pen facility. In a March 10, 1989, letter, WDNR directed Parker Pen to prepare a report describing possible remedial alternatives for the site.

In addition to the scope of work addressing the TCE and chromium, Parker Pen proposed to conduct an investigation of the soil and ground water quality beneath a former above-ground storage tank primarily used to store PCE. The tank was used to store PCE until May 1983, TCE from February 1985 to March 1986 (after the accidental spill at the MW-51 well nest location), and 1,1,1-trichloroethane (1,1,1-TCA) from March 1986 to December 1988. No reported spills or leaks occurred at this tank location.

In April 1989, RMT was asked by representatives of Parker Pen to conduct a field investigation and submit a report addressing the source and extent of chromium and trichloroethylene detected in ground water samples collected adjacent to and west of the Parker Pen facility. RMT was also asked to investigate and report on soil and ground water quality beneath the former PCE storage tank. Parker Pen submitted the report, titled "Hydrogeologic Investigation of Trichloroethylene and Chromium in Soil and Ground Water at Parker Pen USA, Limited," on August 31, 1989 to the WDNR for comment and review.

1.2 Purpose and Scope

The purpose of this report is to review potential remedial alternatives for the site, as requested by WDNR. The remedial alternatives address the following:

- Remediation of TCE and chromium in the ground water downgradient of the 1985 release.
- Residual TCE in soils resulting from the release.
- Residual PCE observed in soils adjacent to the former PCE storage tank.

Specifically, the scope of this work includes the following:

- A review of data describing the occurrence of TCE and PCE at the site, as presented in the RMT report titled "Hydrogeologic Investigation of Trichloroethylene and Chromium in Soil and Ground Water at Parker Pen USA, Limited" dated August 1989.
- For each of the affected media, selection of remedial alternatives appropriate to site conditions. This includes the following:
  - Ground water recovery, treatment, and disposal.
  - Soil excavation and disposal.
  - Soil vacuum extraction.

  For each alternative, major design concepts are developed.
- Evaluation of each alternative based on effectiveness, implementability, and cost. A conceptual level cost estimate has been prepared outlining major cost components.

2. FINDINGS AND CONCLUSIONS

1. TCE and PCE are present in soils and ground water at the site. Direct exposure resulting from dermal contact with these materials appears to be limited. If it is determined that remediation is required, several alternatives exist for the removal of constituents from these media.

2. Chromium, originally a constituent of interest at the site, was determined to be present in soils at or about natural levels. For this reason, the evaluation of alternatives to remediate chromium in soils is believed to be unwarranted. As above, direct exposure resulting from dermal contact with these materials in ground water appears to be limited. If a ground water recovery alternative is implemented, chromium would be recovered concurrently with TCE.

3. The remedial alternative of ground water recovery, treatment, and disposal would provide effective management of ground water containing TCE. A pumping rate ranging from 25 to 50 gpm would control the flow of ground water from the southern part of the facility. Two discharge options are available for treated and untreated ground water. The first option would utilize air stripping to treat ground water prior to discharge to a storm sewer on site and ultimately to the Rock River. The second option would utilize discharge of untreated ground water to the sanitary sewer for treatment in the Janesville Wastewater Treatment Plant. Both discharge options are viable. However, if allowed by the sanitary district, discharge to the sanitary sewer is more cost-effective, as no on-site treatment system or long-term maintenance of a treatment system would be required.

4. The remedial alternative of soil removal would be an effective means of removing residual TCE or PCE at the location of prior storage tanks for these chemicals. However, implementation would be hindered due to the presence of utilities and the proximity of building foundations to the area of excavation.

5. The remedial alternative of vacuum extraction for soils containing TCE or PCE would be a viable alternative and would preclude the need to excavate and treat or dispose of the soil. Two systems would be installed at the previous locations of the TCE and PCE above-ground storage tanks on site. At each location three extraction wells would be installed to a depth of 30 feet from ground surface. The wells would be screened over the lower 25 feet. The alternative would result in reductions in the concentration of TCE or PCE at each location.

3. RECOMMENDATIONS

Several alternatives have been evaluated for possible implementation at the site. If it is determined that remedial action is necessary, the following alternatives are recommended:

1. For ground water, recovery and discharge to the sanitary sewer is the more cost-effective option.

2. For soils, the soil vacuum extraction alternative provides removal of residual TCE and PCE, and does not pose significant constructability issues.

To further evaluate the effectiveness of these alternatives, the following preliminary work is recommended:

1. For ground water, a pump test should be performed to confirm aquifer properties, establish a pumping rate appropriate for full scale, and determine the quality of extracted water.

2. For soils, confirmation of the extent of PCE and TCE at the source locations should be undertaken.

3. In addition, a pilot vacuum extraction test should be performed using the gas probe installed during the site investigation. This will allow a better determination of the recovery rate of TCE and PCE from the soil.

4. REMEDIAL DESIGN BASIS

4.1 Existing Conditions

The site investigation performed by RMT has supplemented the earlier preliminary findings of the JDF RI. The site investigation has identified the nature and extent of constituents in ground water, and provided initial data on the presence of constituents in shallow soils at suspected release points. These conclusions are important in defining the scope of potential remedial actions for the site and can be summarized as follows:

1. A plume of TCE in shallow ground water is located downgradient of the former TCE storage tank and extends to the southwest at least 800 feet. TCE is concentrated in the upper 30 to 40 feet of the aquifer. The shallow part of the plume also contains residual chromium, believed to emanate from past plating operations at the plant.

2. A plume of PCE and TCE is located beneath the northern part of the site and extends to the southwest at least 1,000 feet. The source of this plume is believed to be the JAB, located upgradient of the Parker Pen site.

3. Unsaturated soils beneath the former TCE storage tank contain residual levels of TCE at a depth of up to 27 feet. The lateral extent is not defined.

4. Unsaturated soils beneath the former PCE storage tank contain residual levels of PCE down to 21 feet below the surface. The lateral extent is not defined.

5. Soils in the vicinity of the plant plating operations contain chromium at levels found in natural soils. No source or presence of chromium contamination was identified.

4.2 Remedial Action Objectives

Based on the existing conditions summarized above, specific media and locations can be targeted for development and evaluation of remedial alternatives. These include the following:

- Shallow ground water beneath the southwest portion of the site
- Shallow unsaturated soils at the location of the former TCE storage tank
- Shallow unsaturated soils at the location of the former PCE storage tank

Because the PCE/TCE plume beneath the northern portion of the site is believed to result from off-site activities, it is not included in this evaluation. In addition, elevated levels of chromium in soils have not been identified, and consideration of related remediation is not necessary. Further, residual levels of chromium in ground water coincide with TCE, and would be addressed concurrently with the TCE plume in the southwest portion of the facility.

At the present time, the potential for direct human exposure to constituents present in soil and ground water appears to be limited. Ground water discharges to the Rock River, and because city residences in the area are served by the municipal water supply, there are no ground water users between the plant and the river. TCE which may enter the river is subject to volatilization and dispersion, further mitigating potential exposure by recreational users. Soils at the former tank locations are situated within Parker Pen's property boundaries. This restricts casual contact by such sensitive populations as children, who may ingest soil. Plant workers are not in contact with soils, further limiting the exposure potential.

A formal risk assessment has not been completed for this site. It is, therefore, not possible to quantify the potential exposures described above. At the present time, risks resulting from the site can only be described in a qualitative way.

Because a risk assessment has not been completed, the need for remedial action cannot be clearly established. As a result, the development and evaluation of remedial alternatives described in this report is based on what could be implemented at the site, not necessarily what must be implemented to provide protectiveness to local populations. Ultimately, a "no-action" alternative may be an appropriate response to existing conditions.

4.3 Design Assumptions

Table 4-1 presents the available data that were used to develop and evaluate remedial alternatives. Where complete data was not available from the site investigation, it was necessary to make assumptions regarding design parameters. Changes to these assumptions could affect the feasibility of the alternatives, and the implementability (and costs) of the alternatives may need to be refined after additional data have been evaluated.

In developing potential remedial alternatives it is important to consider prior remedial action. Between February 11, 1985, and February 15, 1985, an estimated 500 gallons of trichloroethylene (TCE) leaked from an above-ground storage tank at the site (see Figure 4-1). The extent of the release was limited by a sloped concrete pad beneath the tank and a 40-mil plastic liner buried approximately three inches beneath the tank. On February 16, 1985, contaminated snow, soil, and a 40-mil plastic liner in the spill area were excavated. The excavation covered approximately a 13-foot by 4-foot area. The excavation went to a depth of six inches below the land surface. The excavated snow was placed in

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TABLE 4-1
DESIGN ASSUMPTIONS

Media	Parameter	Value or Estimate	Basis
Ground Water,	Soil Type	Sands, Gravel	Typical, based on RMT soil boring logs
Saturated Soils	Hydraulic conductivity	7.8×10^{-3} cm/sec	Measured by others on site and at adjacent site
	Hydraulic gradient, horizontal	0.002	Calculated, based on site monitoring wells
	Porosity	0.3	Typical for soils of this type
	Flow velocity	59 ft/yr	Calculated, based on parameters above
	Depth to water table	30 feet	Typical, based on site monitoring wells
	Plume thickness	30 to 40 feet	Typical, based on RMT analytical data
Unsaturated Soils	Soil Type	Silty clay, sands	Typical, based on RMT soil boring logs
	Depth of detectable TCE at former storage tank	Up to 27 feet	Mininum depth, based on RMT analysis
	Affected area		Assumed, based on historical data and existing conditions
	Depth of detectable PCE at former storage tank	Up to 21.5 feet	Minimum depth, based on RMT analysis
	Affected area		Assumed, based on historical data and existing conditions

five 55-gallon drums and stored on site, and then shipped to the LWD, Inc., hazardous waste incinerator. The soils and the 40-mil liner were placed in seven 55-gallon drums and shipped to the Fondessy hazardous waste landfill.

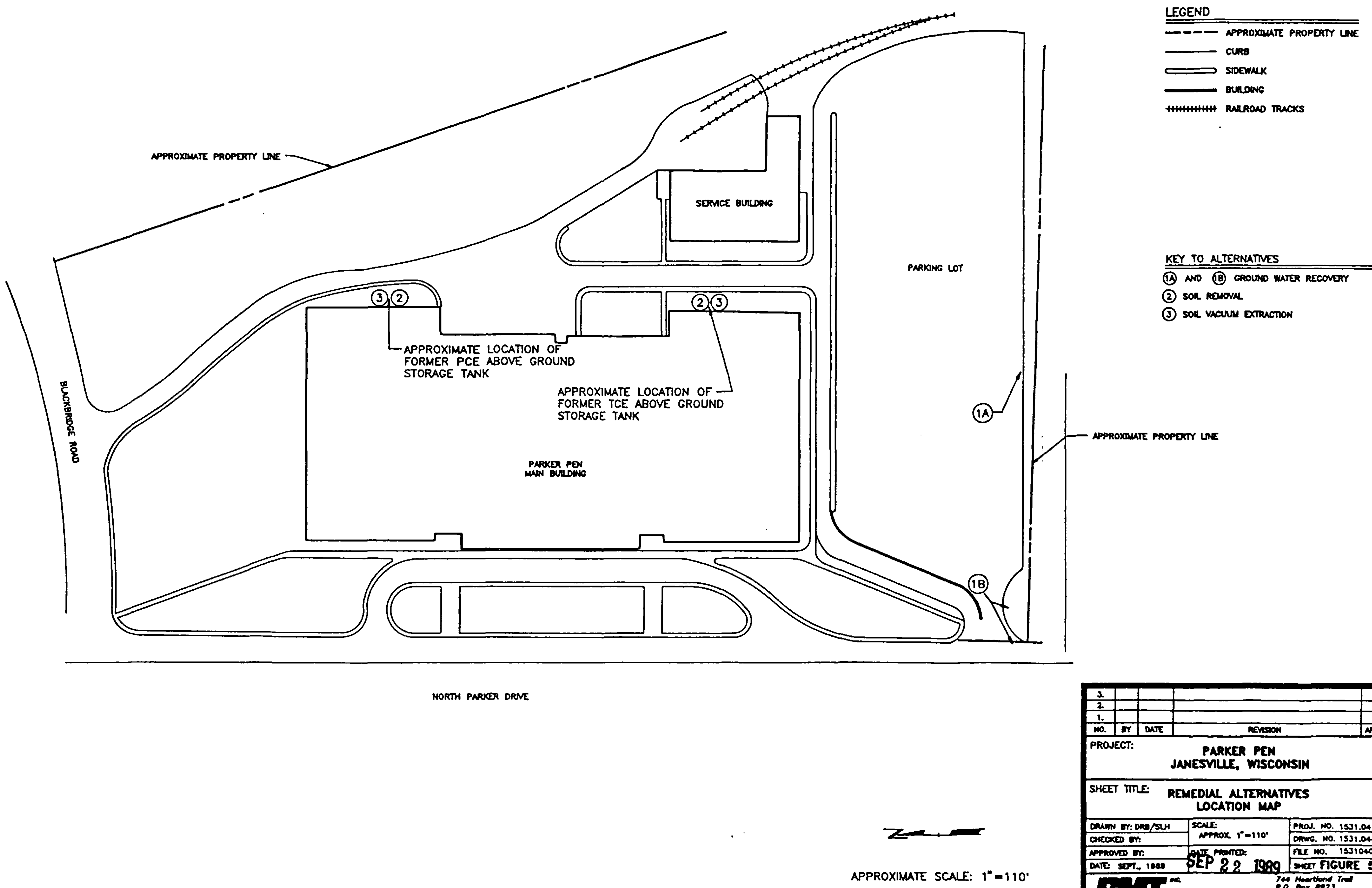
5. REMEDIAL ALTERNATIVES EVALUATION

Based on the existing conditions and remedial action objectives described in Section 4, several specific remedial alternatives have been developed. The basis for each one is summarized as follows:

	Alternative		Basis
1.	Ground Water Recovery		Provides straightforward migration control for ground water containing TCE.
	Option A:	Air Stripping, Storm Sewer Discharge	Air stripping is an appropriate technology for VOC removal; storm sewer discharge is a cost-effective method for disposal.
	Option B:	Direct Sanitary Sewer Discharge	Direct sanitary sewer discharge would preclude the need for pretreatment at an additional cost for disposal.
2.	Soil Removal		Provides a straightforward means to remove the potential sources of TCE and PCE, and provides off-site disposal.
3.	Soil Vacuum Extraction		Provides an alternative to soil excavation, while still providing a level of source control.

The locations of these alternatives in relation to site features is illustrated in Figure 5-1. Alternative 1 addresses migration control, while alternatives 2 and 3 address source control. Alternatives 2 and 3 are mutually exclusive, but either one could be implemented in conjunction with alternative 1. The migration control alternative could also be implemented independently of any additional source control.

These alternatives provide a range of feasible responses to existing conditions. In addition to off-site disposal of soils, a potential option



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3.				
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1.				

PROJECT: **PARKER PEN JANESVILLE, WISCONSIN**

SHEET TITLE: **REMEDIAL ALTERNATIVES LOCATION MAP**

DRAWN BY: DRB/SLH	SCALE: APPROX. 1"=110'	PROJ. NO. 1531.04
CHECKED BY:		DRWG. NO. 1531.04-2
APPROVED BY:	DATE PRINTED: SEP 22 1989	FILE NO. 15310409
DATE: SEPT., 1989		SHEET FIGURE 5-1

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was considered for on-site treatment, using either mechanical or thermal techniques. Either of these methods would require land area for the stockpiling and processing of soil and for the set-up of required earthmoving and mechanical equipment. Because of the confined nature of the Parker Pen site and the proximity of local residents, such options were believed to be inappropriate for application on this project, and have not been developed for this report.

Each alternative is evaluated below on the basis of effectiveness, implementability and cost. Effectiveness is the measure of how well the alternative will perform and the degree to which source or migration control will be accomplished. Implementability includes any unique constructability or permitting issues associated with the alternative. Cost refers to the capital and operating costs associated with implementation of the alternative.

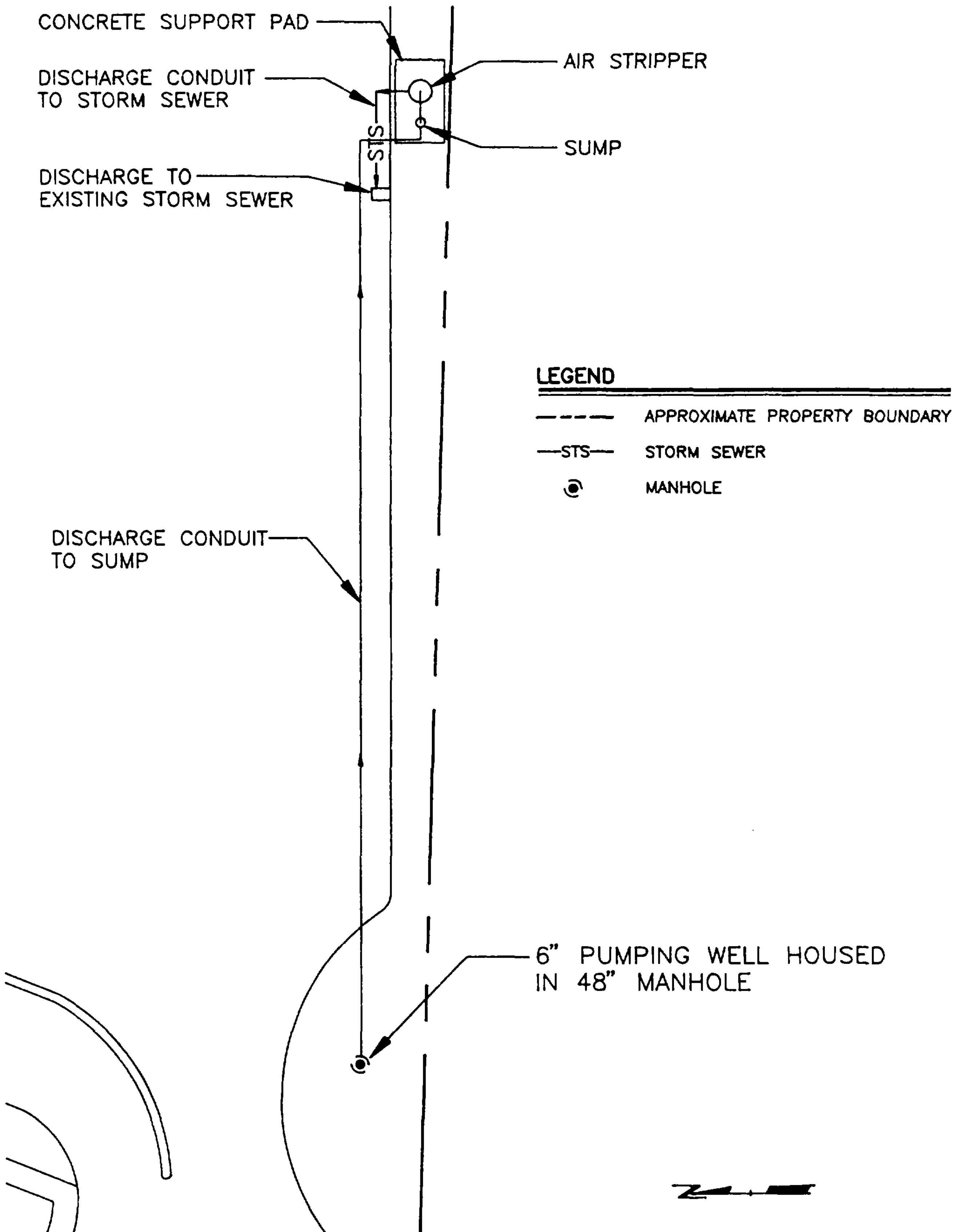
5.1 Ground Water Recovery

Design Concepts

The objectives of this alternative are to contain the TCE plume in the southwest part of the site and to remove ground water for treatment or disposal.

The alternative was designed to prevent the migration of TCE from the site via ground water. The present plume definition indicates that TCE is flowing with ground water southwest of the former TCE storage tank.

This alternative consists of two options, A and B. Option A is illustrated in Figure 5-2 and consists of essentially the following five components/processes:



GROUND WATER RECOVERY OPTION 1A

RMT INC.

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FILE #	15310403

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FIGURE 5-2

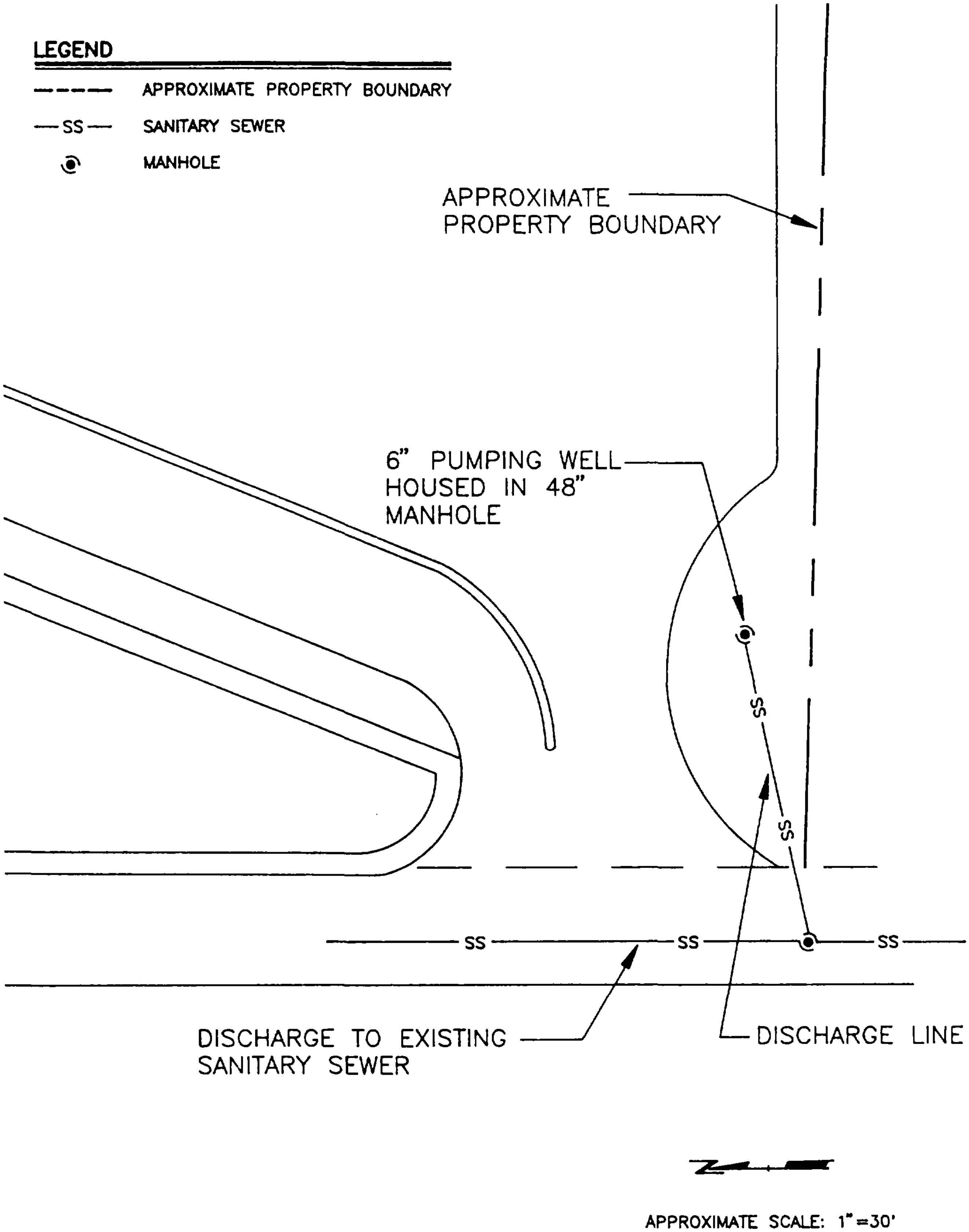
1. Ground water pumping
2. Distribution to treatment system
3. Ground water treatment
4. Distribution to an on-site storm sewer
5. Discharge

Option B is illustrated in Figure 5-3 and consists of the following three components/processes:

1. Ground water pumping
2. Distribution to a local sanitary sewer
3. Discharge

Options A and B would both utilize a pumping well located in the southwest corner of the Parker Pen property. This location was selected based on the present plume configuration. The highest concentration of TCE in the ground water was observed at a water table monitoring well in this location (16,000 μg/L). At the same location, a well screened at a depth of 30 feet below the water table contained 6600 μg/L TCE. Based on data of additional downgradient wells, it was concluded that ground water containing TCE is probably approaching, or discharging to, the Rock River. Therefore, placement of a recovery well in this location would recover water which had yet to reach the property line, as well as water which had passed the property line before discharge to the river.

The following calculations were completed to size the pumping system:



GROUND WATER RECOVERY OPTION 1B

RMT INC.

DWN. BY:	SLH
DATE:	SEPT., 1989
PROJ.#	1531.04
FILE #	15310404

FIGURE 5-3

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- Radius of Influence
- Image well
- Capture zone
- Well discharge
- Pore volume

The radius of influence calculations were initially completed to determine the effect of the pumping well, based on aquifer properties, before accounting for ground water gradient.

Image well calculations were then completed to determine the influence, if any, that the recharge effects of the Rock River would have under various pumping rates. The wells simulated fully penetrating conditions, and simulate a condition where the Rock River and the aquifer would be hydraulically connected. This simulation assumed total hydraulic connection as a conservative assumption.

Capture zone calculations were completed to determine the zone of capture from a pumping well at a specified flow, considering the hydraulic gradient of the water table. These calculations are conservative, and based on the following assumptions:

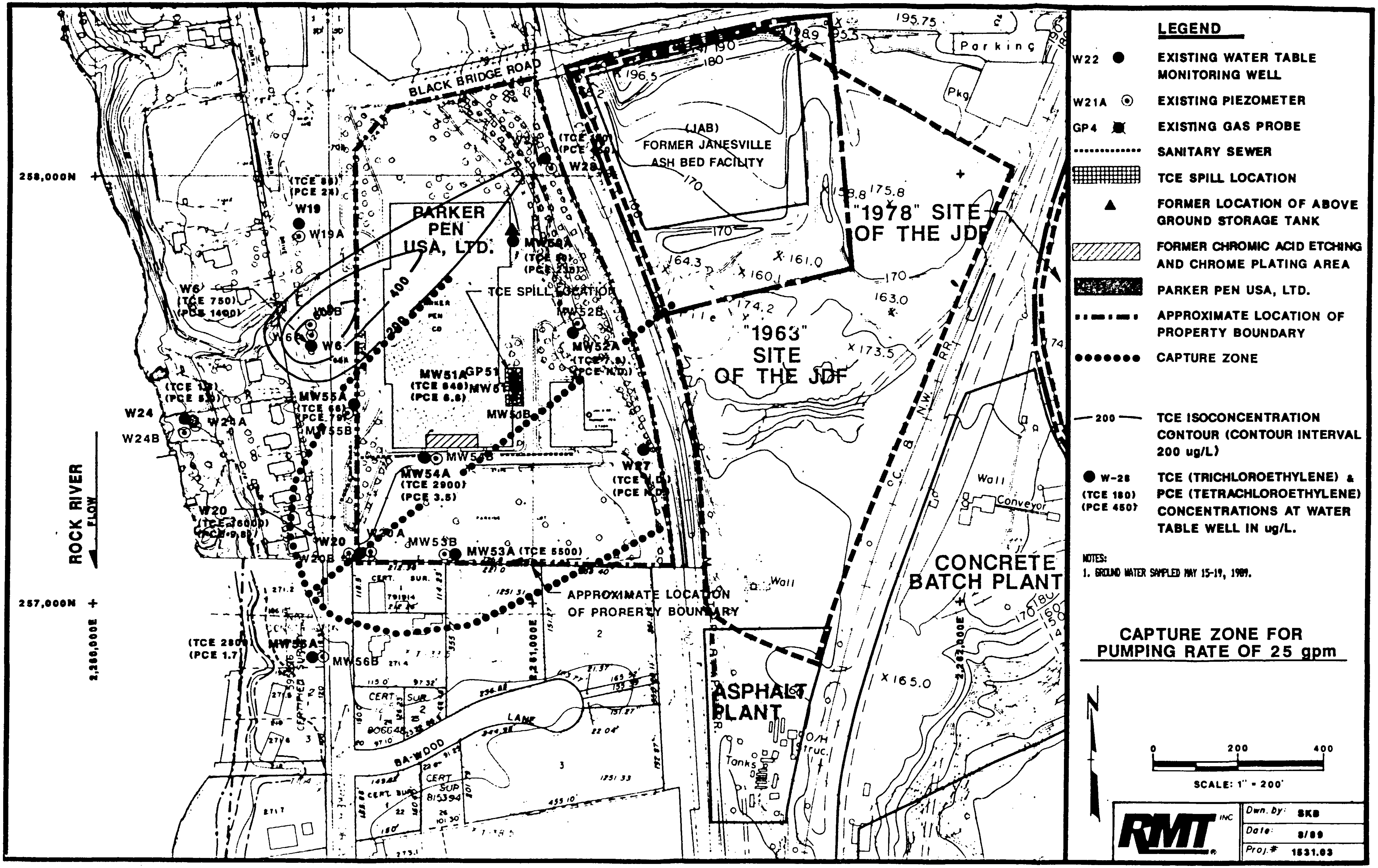
- 80 feet penetration of well; if the well were shallower, the capture zone would be greater, and therefore the calculation represents minimum capture (Bear, 1979).
- Storativity of 0.3, which is conservatively high; a lower value would result in a greater capture zone.

The design strategy for the pumping scheme was to provide sufficient influence from the pumping well to contain the TCE plume. The calculations indicate that a pumping rate of 25 gpm is adequate, without pumping excessive amounts of clean water and without drawing back water from the river. The resulting capture zone is presented in Figure 5-4. The well would be six inches in diameter, installed to a depth of 80 feet, with a 25-foot screen length. The pumping well would be housed in a 48-inch manhole with supporting pumping controls.

Because of the complexities of solvent behavior in ground water, it is not possible to accurately predict the duration of pumping necessary to remove TCE from the aquifer. One general approach is to calculate the time necessary to recover one "pore volume" of water from the plume, and then assume that multiple volumes must be recovered to thoroughly flush residual TCE which may remain bound to soil particles. At a pumping rate of 25 gpm, and given the aquifer properties described earlier, recovery of one pore volume will take 4 to 5 years. To recover multiple pore volumes could mean a pumping duration of 10 to 20 years.

After recovery, under Option A, ground water would be sent to treatment through an on-site air stripper. The recovery well would discharge through 180 feet of conduit buried at a minimum of 48 inches. The pipe would discharge to a 300- gallon sump. The sump would be equipped with a pump capable of delivering the head required to lift water to the top of the treatment system.

The treatment system would consist of a packed-tower air stripper blower. The stripper would be approximately two feet in diameter and 25 feet in height. The blower and pump would be placed in an enclosure to protect them from the environment. The stripper and sump would be placed on a concrete pad. The system would be winterized, utilizing heat tape



SEP 22 1989

FIGURE 5-4

and insulation on the riser pipe. The demister portion of the system would also be insulated.

This design assumes influent concentrations below 5000 $\mu g/L$ of TCE. This concentration was assumed because dilution would be expected as a result of ground water pumping. If a higher influent concentration would be present, recycling of water through the air stripper or an additional air stripper would be required. The influent concentration would be established during the pumping test prior to system design. A removal efficiency of 95 percent or greater should be achievable using the design specified above.

The treated water from the stripper would be discharged through 34 feet of conduit to an adjacent storm sewer, subject to state permit requirements. The storm sewer discharges to the Rock River west of the site. Air would be discharged through a stack 26 feet above ground to the atmosphere.

Under Option B, ground water would be discharged directly to the local sanitary sewer. The system would include the pumping well previously described. The pumping well would discharge through 75 feet of conduit buried at a minimum of 48 inches. The conduit would discharge to the sanitary sewer located under North Parker Drive. Preliminary discussions with the City of Janesville indicate that the City is willing to accept a flow of the quantity and quality described above.

Effectiveness

The ground water recovery alternative would be effective at controlling the flow of ground water containing TCE to the Rock River.

Pumping would reduce the mass of TCE present in ground water at the site. The use of this system would prevent long-term TCE migration via the ground water pathway, and would mitigate potential present and future effects on human or envitonmental receptors in the Rock River.

The present design is based on limited hydrogeological data. To confirm that the design pumping rate would provide effective capture, an in-field pump test should be performed prior to full-scale implementation.

Option A would provide effective treatment of ground water prior to discharge. Air stripping is a proven technology for applications of this type, and can provide cost-effective treatment of water containing TCE.

Option B would not provide for treatment directly on site, but would take advantage of volatilization occurring within the sanitary sewer and at the Janesville wastewater treatment plant.

Implementability

The installation of a ground water recovery system is technically feasible. The construction of the system would require special materials and technologies that are commercially available. Final design and construction of the recovery system could take six months to implement, allowing for engineering equipment mobilization, and recovery system construction.

This alternative utilizes well established and proven technology. The system would operate reliably over its design life, assuming proper operation and maintenance (O&M). Option B would require limited O&M of the pumping system, since there would be no on-site treatment. Option A would require more O&M, as the treatment system would be on site and would require periodic care. In both cases, periodic pump replacement would be necessary.

Both options would require regulatory approvals and/or permits. Under Option A, Parker Pen would have to modify its discharge permit for the storm sewer discharge to account for the additional flow from the air stripper. Under Option B, Parker Pen would need to establish a formal agreement with the City for sanitary sewer discharge.

The air emissions from the proposed extraction systems would likely be subject to section 419.04, Wisconsin Administrative Code, regarding discharge of VOCs. The air emission limit stated in this regulation is 5.7 liters (1.5 gallons) of VOC waste per day during the ozone season. Recent WDNR policy has allowed for 100 pounds of VOC per day to be emitted to the air from solvent clean-up operations. Since this limit has not been formally established through regulations, the allowable VOC emissions limit that would apply to this facility would need to be established through consultation with the WDNR.

Chapter NR 445, Wisconsin Administrative Code, regarding the control of hazardous air pollutants has specific emission limits for TCE. The limit, 94.416 pounds per hour, is significantly higher than the limit of 100 pounds of VOC per day mentioned above. The Chapter NR 445 limits would, therefore, not be exceeded if the extraction systems remained within the limit of 100 pounds per day.

Costs

A cost estimate for each option is presented in Tables 5-1 and 5-2, respectively. The estimates are approximate, and provide a general level of expenditure for both construction and operations.

The costs for this alternative have a potential to vary from the estimated costs due to the following:

- The recovery well sizing may change if the hydraulic characteristics of the aquifer vary from those assumed for this alternative. In-field tests prior to and during the remedial design would be required, to fully characterize the site's hydrologic properties. If a larger well or additional wells are required, costs will increase.
- Flow rates and contaminant removal rate may differ from the estimated rates. An increase in pumping duration will result in continued operations and maintenance expenditures.
- If WDNR air discharge limits require treatment of the off-gas, construction and operations costs will increase.

5.2 Soil Removal

Design Concepts

The objective of this alternative is to physically remove the potential sources of TCE and PCE available for future migration. This alternative involves the excavation of soil from identified source areas, followed by disposal of the material at an approved off-site landfill.

Option A addresses the excavation of soil in the area of the former TCE above-ground storage tank. The conceptual design of the option is presented in Figure 5-5. Because the extent of TCE in soils is not known, it is assumed that a volume of 750 cubic yards will require excavation. This represents an area of approximately 25 by 50 feet between the plant building and nearby roadway.

TABLE 5-1

CONCEPTUAL COST ESTIMATE
ALTERNATIVE 1A PUMP AND TREAT (AIR STRIPPING)

Item Description	Total ($)	Subtotal ($) *
Mobilization	$ 5,000	
Construction/Site Work	60,600	
Purchased Equipment	33,000	
Engineering	35,000	
Start-up and Shake-down	10,800	
Contingency	19,720	
Total Capital Costs		$ 164,000
Operations & Maintenance		
Annual Costs		
Operating Labor	24,000	
Maintenance	8,700	
Power	1,040	
Administration	5,000	
Annual Contingency	7,748	
Subtotal, Annual Costs		$ 46,000

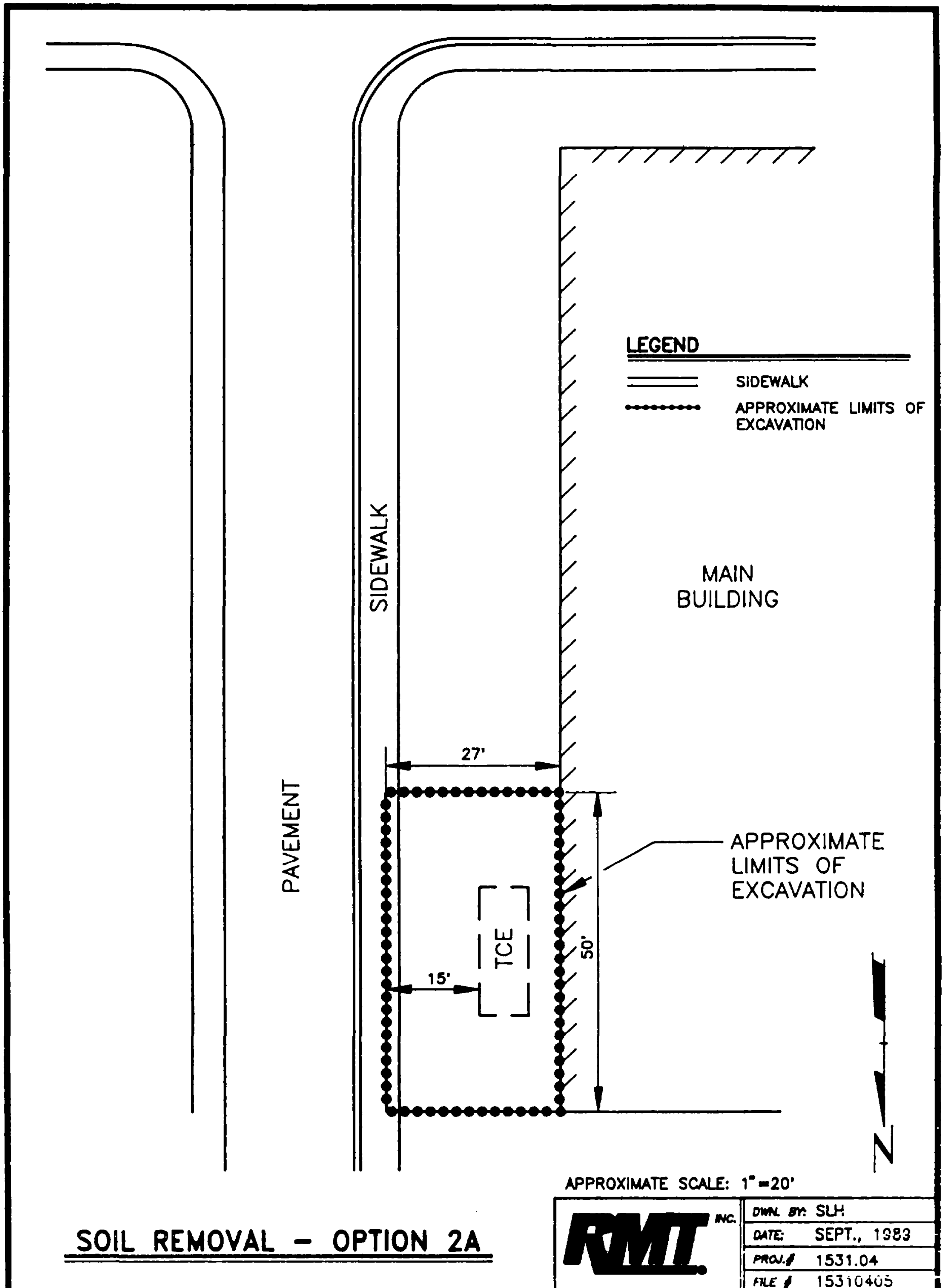
* Rounded off to nearest thousand.

TABLE 5-2

CONCEPTUAL COST ESTIMATE
ALTERNATIVE 1B PUMP AND SANITARY SEWER DISCHARGE

Item Description	Total ($)	Subtotal ($) *
Mobilization	$ 3,000	
Construction/Site Work	15,645	
Purchased Equipment	4,500	
Engineering	25,000	
Licenses/Permits	2,000	
Contingency	4,629	
Total Capital Costs		$ 55,000
Operations & Maintenance		
Annual Costs		
Operating Labor	8,000	
Maintenance	3,900	
Power	600	
Users Fees	17,500	
Administration	5,000	
Annual Contingency	7,000	
Subtotal, Annual Costs		$ 42,000

* Rounded off to nearest thousand.



SOIL REMOVAL - OPTION 2A

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FIGURE 5-5

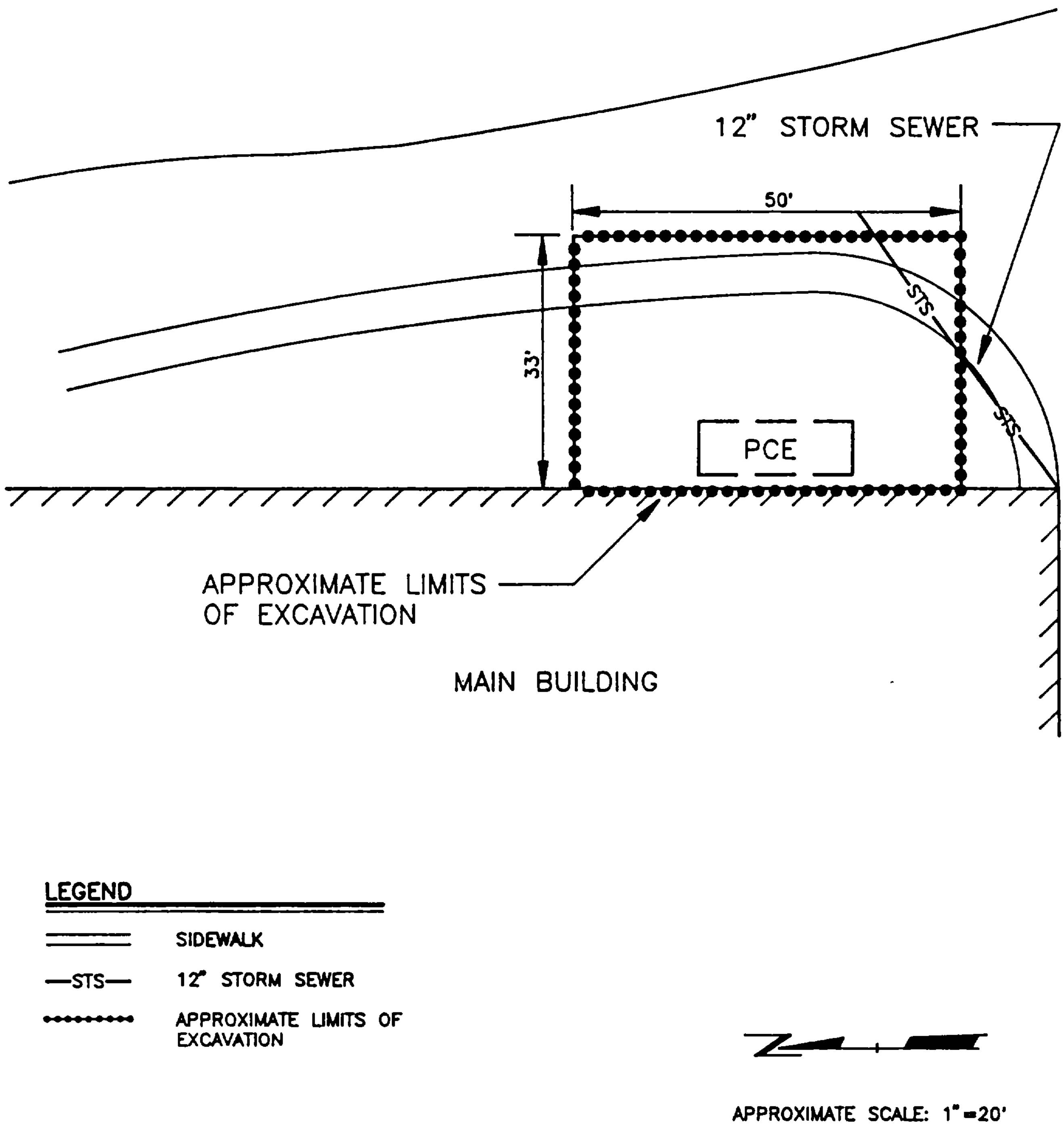
Option B addresses the excavation of soil in the vicinity of the prior PCE above-ground storage tank. The conceptual design of this option is presented in Figure 5-6. As above, the volume of soil is assumed to be 950 cubic yards, representing an area of approximately 30 by 50 feet between the building and road.

Excavation would be completed to a depth of 15 feet in both options A and B. Each area would be shored to protect the plant building and maintain the existing roadway. An eight-inch fire loop main runs under each site at a depth of approximately seven feet. This pipe will be supported during excavation. Option B would require the removal of portions of the existing curb and gutter, and some of the existing asphalt. This option would also require the removal and replacement of a portion of the existing sewer line. The horizontal extent of contamination was assumed to be 15 feet from the location of the prior above-ground storage tanks in both options.

The excavated material would be loaded in 15-cubic-yard roll-off boxes lined with plastic. The material would be transported to an approved facility for disposal.

Effectiveness

This alternative would be effective in reducing potential future migration by removal and disposal of soil containing TCE and PCE. Option A would result in the removal of 750 yd^3 of soil, and Option B would result in the removal of 950 yd^3 of soil. The mobility and volume of TCE and PCE would be reduced by excavation and removal from the site. The toxicity of the excavated material would not be reduced, as no treatment is involved. Materials would be land disposed in an approved landfill.



SOIL REMOVAL – OPTION 2B

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FIGURE 5-6

Because of the proximity of the main plant building, shoring would be required. The additional cost will allow deeper excavation. However, until a more detailed geotechnical analysis is performed, it is not known whether an excavation could reach the lowest detectable levels of TCE and PCE. As a result, the effectiveness of this alternative in removing all residual solvent is uncertain.

Workers involved with implementation of this alternative would potentially be in dermal contact with soils, and in the presence of airborne particles. The major potential environmental impact would be airborne particulates and potential erosion resulting in off-site runoff of excavated material. Impacts would be minimized by controlling erosion in the area of excavation during construction. Excavated material could be sprayed with water to control dust during excavation; temporary berms would be utilized for runoff control.

Implementability

The excavation of contaminated materials is technically feasible. The implementation of both options would be complicated by the presence of a eight-inch fire loop around the Parker Pen facility. This pipe would need to be supported and protected during construction to maintain fire protection at the facility. Both options would require the use of shoring around the perimeter of the construction area to maintain vertical side walls and to provide structural support of the building. Both options would require removal of the monitoring well(s) located in these areas. Option B would also require the removal of a portion of the existing storm sewer, and replacement. This option would also require the removal of a portion of the existing curb and gutter, and a portion of the asphalt driveway. All of these activities can be completed utilizing standard construction technologies. The excavated areas would be backfilled with clean fill.

This alternative would require proper disposal of excavated material at a secure land disposal facility. Based on the levels of solvents detected to date, the "land ban" on hazardous wastes should not restrict the disposal of this material. Two disposal facilities have indicated that they could accept the material -- the Adam Center site in Indiana, and the CID site located in Illinois. Both sites have sufficient capacity for the amount of material that would be excavated. Both sites require site approval before material can be accepted. The CID site also requires an Illinois state permit for disposal of material. The Indiana site is preferred, because Illinois state permitting can take up to 89 days for approval. The site approval process requires a 14 to 21-day time frame for both sites.

Cost

Costs for Options A and B are presented in Tables 5-3 and 5-4, respectively.

The costs for this alternative have a potential to vary from the estimated costs due to the following:

- If the extent of contamination is found to extend beyond the areas assumed in this design, overall project costs will increase.
- The existence of utilities other than those stated could increase the cost of this alternative.

((

TABLE 5-3

CONCEPTUAL COST ESTIMATE
ALTERNATIVE 2 SOIL EXCAVATION OF PRIOR TCE STORAGE TANK AREA

Item Description	Total ($)	Subtotal ($) *
Mobilization	$ 12,500	
Construction/Site Work	99,235	
Off-Site Disposal	224,250	
Engineering	30,000	
Contingency	67,197	
Total Capital costs		$ 433,000
Operations & Maintenance		
Annual Costs		
Administration	5,000	
Annual Contingency	1,000	
Subtotal, Annual Costs		$ 6,000

* Rounded off to nearest thousand.

TABLE 5-4

CONCEPTUAL COST ESTIMATE
ALTERNATIVE 2 SOIL EXCAVATION OF PRIOR PCE STORAGE TANK AREA

Item Description	Total ($)	Subtotal ($)
Mobilization	$ 15,500	
Construction/Site Work	117,325	
Off-Site Disposal	276,000	
Engineering	25,000	
Contingency	81,765	
Total Capital costs		$ 516,000
Operations & Maintenance		
Annual Costs		
Administration	5,000	
Annual Contingency	1,000	
Subtotal, Annual Costs		$ 6,000

* Rounded off to nearest thousand.

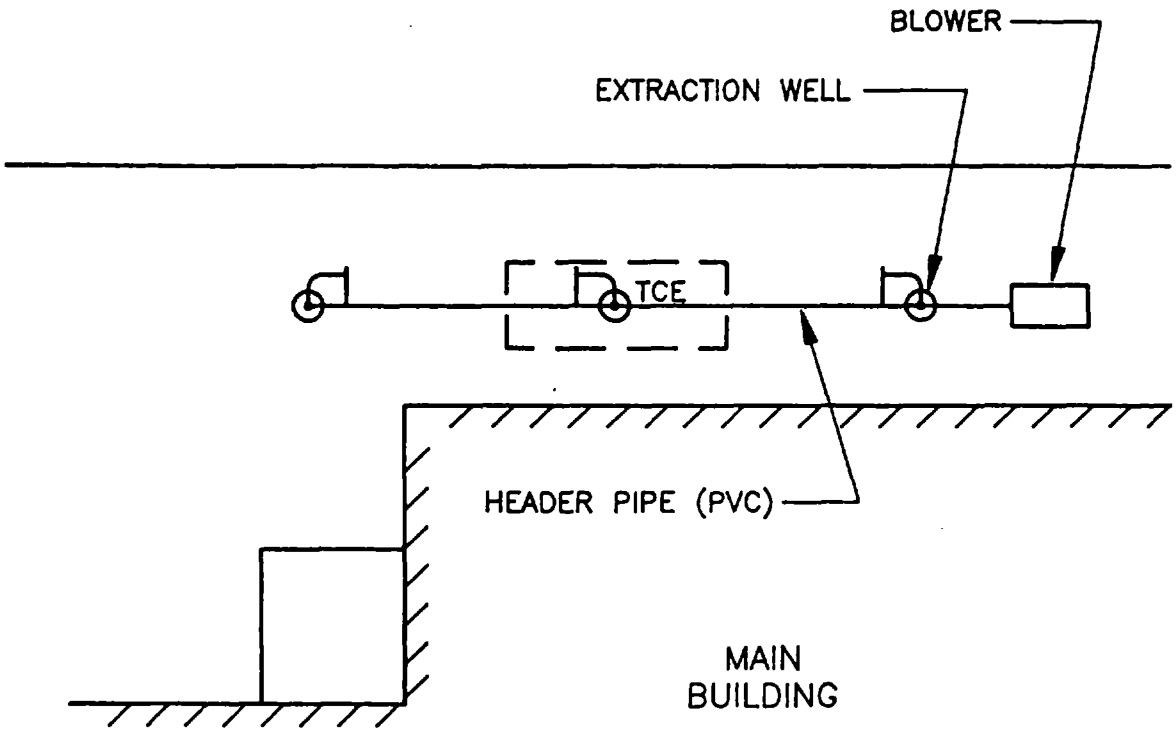
5.3 Soil Vacuum Extraction

Design Concepts

The objective of this alternative is to promote the mass transfer of volatile organic compounds from the unsaturated soils into the air. A soil vacuum extraction (SVE) system would serve as an alternative to direct soil removal, while providing a decrease in levels of residual TCE and PCE which may be subject to leaching to the water table.

A typical vapor extraction system consists of a vacuum pump or blower connected to a series of wells. The extraction well(s) are screened to a confining layer or to the water table. The well(s) are screened over the unsaturated depth. The vacuum from the pump causes air to flow through the soil to the extraction wells, which in turn enhances volatilization of constituents. The extraction rates range from 10 to 400 ft^3/min. Pressure drops within the wells range from 6 to 60 inches of water. The air is either discharged to the atmosphere or treated on site, depending on state requirements.

Option A addresses vacuum extraction in the area of the former TCE above-ground storage tank. The conceptual design of this option is presented in Figure 5-7. The system would incorporate three extraction wells to a depth of 30 feet. The wells would be screened on the lower 15 feet. The wells would be located approximately 30 feet on center. The wells would be grouted to prevent short circuiting of the extraction system. Each well would be equipped with a flow monitoring device, sample port and shutoff valve. The wells would be connected to a main header which in turn will be connected to a vacuum pump. The pump will operate on three-phase power. The off-gas from the pump will be vented to the



SOIL VACUUM EXTRACTION – OPTION 3A

APPROXIMATE SCALE: 1"=20'

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	FILE # 15310407

FIGURE 5-7

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atmosphere. The vent pipe will extend to a height of 26 feet to allow for emissions above the Parker building.

Option B addresses vacuum extraction in the area of the former PCE above-ground storage tank. The conceptual design of this option is presented in Figure 5-8. The design is the same as that described for Option A.

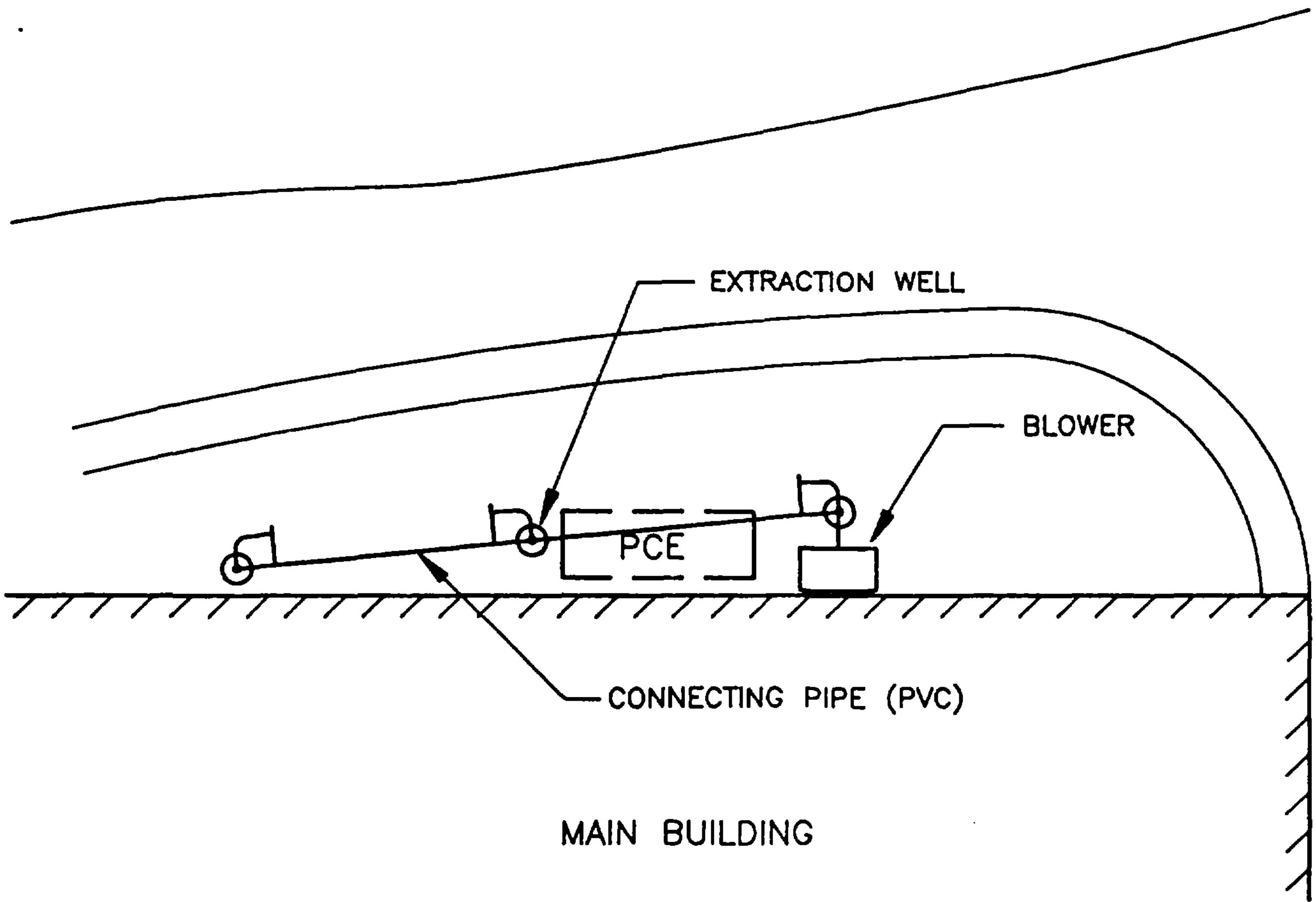
Effectiveness

The extraction wells would penetrate into the affected soil and provide effective removal of TCE and PCE. The extraction system would reduce the mass of solvent present in unsaturated soils. The use of this system would reduce the potential for leaching and long-term migration via the ground water pathway.

Because the behavior of TCE and PCE in the soil environment is not well understood, the performance of a SVE system cannot be accurately predicted. In general, performance is improved in sandy soils, as are found at depth at the site. Since both TCE and PCE are found within these sandy soils, the system will provide a certain level of removal of these constituents, but the extent of removal cannot be quantified. It is probable that the system would not effectively remove all of the TCE and PCE in the soil, and that some residual levels would remain.

Implementability

The installation of a vacuum extraction system is technically feasible. The construction of the system would require special materials and technologies that are commercially available. Final design and



SOIL VACUUM EXTRACTION – OPTION 3B

APPROXIMATE SCALE: 1" = 20'

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SEP 22 1989

FIGURE 5–8

construction of the extraction system could take four to six months to implement, allowing for engineering and system design, equipment mobilization, and extraction system construction.

This alternative uses well established and proven technology, but is limited by the inability to accurately predict performance as described above. The system would operate reliably for its design life of one year, assuming proper operation and maintenance (O&M) of the system.

This alternative would require the placement of a pumping system and housing in the area of the extraction system for both alternatives. The installation of wells would be accomplished using standard drilling technologies. The eight-inch fire main would need to be accurately located prior to construction.

Costs

The cost for both options under this alternative are contained in Table 5-5.

The cost in this alternative have a potential to vary from the estimated costs due to the following:

- The nature and extent of TCE and PCE in both options is based on one soil boring. Future data may indicate a greater extent than that used in design of this alternative, and result in additional well requirements.
- TCE and PCE may prove to be extremely recalcitrant in the soil environment at the site, resulting in poor system performance or an extended period of operation.

TABLE 5-5

CONCEPTUAL COST ESTIMATE
ALTERNATIVE 3 VACUUM EXTRACTION

Item Description	Total ($)	Subtotal ($) *
Mobilization	$ 5,000	
Construction/Site Work	11,900	
Leased Equipment	208,000	
Engineering	17,000	
Licenses/Permits	10,000	
Start-up and Shake-down	10,800	
Contingency	44,980	
Total Capital costs		$ 308,000
Operations & Maintenance		
Annual Costs		
Operating Labor	10,000	
Maintenance Labor	9,600	
Power	1,320	
Administration	5,000	
Annual Contingency	5,184	
Subtotal, Annual Costs		$ 31,000

* Rounded off to nearest thousand.

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25 September 1989

Mr. Patrick McCutcheon
State of Wisconsin
Department of Natural Resources
Southern District Headquarters
3911 Fish Hatchery Road
Fitchburg, WI 53711

Dear Mr. McCutcheon:

Enclosed are three (3) copies of our "Evaluation of Remedial Alternatives" report prepared by our consultant, RMT, Inc.

If you have any questions, please call me at (608) 755-7585.

Regards,

John Houseman

John Houseman
Manager Plant Engineering

JH/caf

cc: Mr. Daniel Cozza
U.S. EPA (with attachments)

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