REGULATORY DESIGN REPORT AND SAMPLING PLAN FOR A SOIL REMEDIATION SYSTEM

PREPARED FOR
COOK COMPOSITES & POLYMERS COMPANY
SAUKVILLE, WISCONSIN

PREPARED BY
RMT, INC.
MADISON, WISCONSIN

MARCH 1995

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COOK COMPOSITES AND POLYMERS

• *Imagination* • *Innovation*

March 24, 1995

Mr. Timothy S. Mulholland, Ph.D.
Waste Management Engineer
Hazardous Waste Management Section
Bureau of Solid and Hazardous Waste Management
Wisconsin Department of Natural Resources
101 South Webster Street
P.O. Box 7921
Madison, WI 53707

RE: Cook Composites and Polymers Co.
Regulatory Design Report and Sampling Plan
Soil Remediation System

Dear Mr. Mulholland:

Enclosed for your review and approval is tthe Regulatory Design Report and Sampling Plan for the Soil Remediation System at Cook Composites and Polymers Co.'s (CCP's) Saukville, Wisconsin facility. The report is intended to address the concerns expressed in your September 27, 1994, letter.

As discussed with Jim Rickun and Leo Tramm of RMT, Inc., and me on February 27, 1995, CCP would appreciate an expeditious review and approval of this document as soon as possible, with a targeted response by March 31, 1995.

Please call if you have any questions regarding the enclosed document.

Sincerely,
Cook Composites and Polymers Co.

Craig R. Bostwick
Corporate Manager Environmental & Safety

Enclsoure

cc: Eric Naimark - CCP
James Rickun - RMT, Inc.
Leo Tramm - RMT, Inc.

CCP

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Section 1
INTRODUCTION

1.1 Background

Cook Composites and Polymers Company (CCP) operates a resin manufacturing facility in Saukville, Wisconsin, in an area of mixed industrial/residential land use. Historical releases, near a former hazardous waste incinerator, of compounds used in the resin manufacturing process, primarily aromatic hydrocarbons, have affected soil and groundwater at the site. The Wisconsin Department of Natural Resources (WDNR) has been overseeing closure activities at this unit under the former NR 181 and currently under NR 600 of Wisconsin Administrative Code (WAC).

The geologic setting at the site has strongly influenced remedial progress. The CCP facility is underlain by a till layer, the thickness of which varies between 15 and more than 200 feet. The till is generally 15 to 30 feet thick, based on the on-site boring logs. The till contains considerable fine-grained material, and generally has low to moderate permeability. The till is underlain by a fractured dolomite aquifer that extends to a depth of greater than 500 feet below grade. The water table at the northern end of the site occurs in the till, and varies between 3 and more than 10 feet below grade over the period of record (1988 to present).

The remedial activities to date have focused mainly on the prevention of infiltration of rainwater at the site, and the establishment of hydraulic control of affected groundwater in the shallow and deep groundwater flow systems. The shallow flow system occurs primarily in the till, and the deep flow system occurs primarily in the dolomite aquifer.

In suspected source areas at the site, such as at the former hazardous waste incinerator, residual aromatic hydrocarbons remain in the vadose zone, below the ground surface but above the water table, at concentrations above the local background. A modified closure plan for this unit was submitted to the WDNR in April 1992 (Appendix A). This closure plan states that the current remedial action objective is to remove aromatic hydrocarbons from the vadose zone to a background concentration of 530 mg/kg total benzene, toluene, ethylbenzene, and xylenes (BTEX), and prevent further migration to the groundwater flow system.

1.2 Purpose and Scope

The purpose of this report is to present a regulatory design report and sampling plan, in accordance with WAC NR 680.05, and as requested by the WDNR in a September 27, 1994 letter. The report contains details on each of the following topics, with respect to the proposed remediation system at the former hazardous waste incinerator:

- Design concepts
- Regulatory standards and permits
- Monitoring and reporting
- Routine operation and maintenance
- Schedule for construction and startup
- Closure sampling plan

The scope of the work included the following activities:

- A review of each of the following RMT, Inc. (RMT), documents relating to activities near the former hazardous waste incinerator area:
  - *Closure Plan Modification* (April 1992)
  - *Semivolatiles Investigation Report for Closure of the Former Hazardous Waste Incinerator and Storage Area* (January 1993)
  - *Results of Soil Vapor Extraction Pilot-Scale Test* (September 1993)
- A review of each of the following documents, prepared by parties other than RMT, relating to activities near the former hazardous waste incinerator area:
  - September 27, 1994, letter from Timothy S. Mulholland (WDNR) to Craig Bostwick (CCP) regarding "Review of Conceptual Design for soil vapor extraction (SVE) System at Former Hazardous Waste Incinerator"
  - CCP Conditional Closure Plan Modification Approval - September 14, 1992.
- Preparation of this report, including a description of the full-scale system design with a plan sheet of the system layout; a closure sampling plan; a schedule for remediation, including installation and submittal of the Construction Documentation Report; and a description/schedule of biannual progress reports.

Section 2
DESIGN CONCEPTS

2.1 Pilot Test Results

Appendix B contains a copy of the September 1993 results of the pilot-scale SVE testing conducted at CCP's Saukville facility. The objective of the pilot-scale SVE test was to evaluate the effectiveness of SVE at the site and to obtain airflow and exhaust chemistry data for the design of a full-scale system. The former hazardous waste incinerator area was paved prior to the pilot-scale testing to enhance the vacuum developed in the soil, and to better represent full-scale conditions.

At the time of the pilot test, two vertical vacuum extraction wells (VE-1 and VE-2), screened in the unsaturated zone, were installed near the former hazardous waste incinerator area. The two 4-inch PVC wells were installed at the approximate locations shown on Sheet 3, Appendix B. Two vapor monitoring wells (VM-1 and VM-2) were also installed for the purpose of monitoring soil vacuum. During installation of the SVE wells, soil samples were collected and analyzed to determine the initial concentrations of BTEX and semivolatiles in the soil. Physical soil characteristics were also determined, including Atterberg limits, grain-size distribution, and moisture content.

Two separate pilot tests were conducted over a 3-hour period on June 15, 1993, each producing similar results. The first pilot test was conducted at VE-1, located at the west end of the former hazardous waste incinerator area, and was started at 9:30 a.m. For this test, a higher vacuum (approximately 40 inches water column) was applied, and it induced a flow rate of approximately 45 standard cubic feet per minute (scfm). After 2 hours, the vacuum level had to be reduced due to the increase in water level in the well, which caused water to be drawn through the vacuum blower. A reduction to 21 inches of water column reduced the flow rate to approximately 40 scfm, but did not reduce the water level in the well. A limited vacuum was observed at VM-1, approximately 25 feet from VE-1, during the test. Six exhaust samples, which were collected routinely throughout the test, contained measurable concentrations of BTEX.

The second pilot test was conducted at VE-2, located at the east end of the former hazardous waste incinerator area, and was started at 1:00 p.m. For this test, a lower vacuum (approximately 22 inches water column) was applied in an attempt to reduce the effect on the water table level observed in the first pilot test. This lower vacuum induced a flow rate of approximately 33 scfm. However, even at the low vacuum rate, the water level in the vapor extraction well increased. After 1.5 hours of operation and with groundwater levels already increasing, the vacuum was increased to 35 inches of water column at an approximate flow of 44 scfm. This increase was performed to allow an observation of the effect of increased vacuum levels on exhaust concentrations. During this test, no vacuum was observed at either of the vapor monitoring wells or at VE-1. Six exhaust samples, which were collected throughout the test, contained measurable concentrations of BTEX.

2.2 Design Basis

The pilot test results indicate that BTEX compounds are extractable through SVE in the area of the former hazardous waste incinerator. Exhaust concentrations ranged from 10^{-4} to 10^{-5} pounds (total BTEX) per cubic foot of exhaust, which are generally moderately high when compared to RMT's experience at other sites.

Both pilot tests indicated a limited or no radius of influence of the vacuum from the vapor extraction wells. RMT believes that this was due to the atypically high groundwater levels. It is believed that, due to the excessive rainfalls prior to the pilot test, the groundwater level at CCP's Saukville facility had risen from previously measured levels of 8 to 10 feet below grade to 5 to 6 feet below grade. Also, because of the high water level, a reduced vacuum had to be used, thus limiting the radius of influence. A review of the water levels in the vapor extraction wells during the pilot tests indicated that the water table elevation was most likely obstructing the screened interval of the wells.

The pilot testing demonstrates the feasibility of applying SVE for achieving the closure performance standard at the former hazardous waste incinerator area. Because of the excessive groundwater that entered the system during the test, the installation of a hybrid SVE/groundwater extraction system is proposed. The proposed system should allow remediation of the shallow soil to continue, despite variations in groundwater elevations.

During periods of high water, the SVE system may still be operated, because the water table in the immediate vicinity of the SVE wells will be depressed by groundwater pumping. During periods of low groundwater, the SVE system will be able to extract volatile organic compounds (VOCs) from a greater thickness of affected soil. **It should be noted that the intent of the project is not to remediate shallow groundwater in the area; groundwater will only be pumped to maintain an open screened interval on the SVE wells.**

2.3 Soil Vapor Extraction System Design

The specific components of the system are as follows:

- ***Well Construction*** - The original SVE wells (i.e., VE-1 and VE-2) are 4 inches in diameter. To allow additional room to accommodate the well pump and instrumentation necessary as part of the proposed system, two additional 6-inch-diameter wells (VE-3 and VE-4) were installed in locations near the former hazardous waste incinerator. The wells were installed using the drive and wash drilling technique to minimize smearing of the borehole. The depth of the new wells are approximately 15 feet and 12 feet, respectively, and the wells are screened from approximately 4 feet to depth. Sheet 3, Appendix C shows the approximate locations of these two wells.

- ***Groundwater Extraction*** - Well pumps will be installed in all four vapor extraction/groundwater extraction wells (VE-1, VE-2, VE-3, and VE-4). Based on the soil types encountered and the aquifer properties, a pumping rate of 1 to 2 gallons per minute (gpm) per extraction well should provide a sufficient extraction rate to depress the water table in the vicinity of the former hazardous waste incinerator. The pressure and groundwater extraction rate will be metered at each of the individual wells and as a total combined flow. Extracted groundwater will be routed to an existing sanitary manhole adjacent to building 64.

- ***Vapor Extraction*** - The two new extraction wells (VE-3 and VE-4) and the two existing extraction wells (VE-1 and VE-2) will be hard-piped through a separator tank to an explosion-proof regenerative blower. The extraction blower was sized to provide an airflow on the order of 100 scfm per well at a vacuum of approximately 40 inches water column. Other components of the vapor extraction system will include pressure and flow indicators at each of the extraction/recovery wells; control valves; sampling ports; an inlet filter; vacuum and pressure relief valves; a discharge silencer; and pressure, temperature, and flow indicators/switches located at key points along the system.

This equipment and other ancillary controls will be housed in a small structure located adjacent to the existing nonhazardous waste incinerator control building. A central control panel will be mounted external to this structure.

The final design of the system has culminated in the preparation of construction plans and specifications. A copy is contained in Appendix C. Upon WDNR approval of this design report, CCP will use these documents for retaining a construction contractor to build the project.

Section 3
REGULATORY STANDARDS AND PERMITS

3.1 Air Emissions

Emissions from the proposed SVE system will be vented to the atmosphere. Table 1 presents a summary of exhaust measurements made during the June 1993 pilot test conducted by RMT. If we assume that the SVE system will be sized to provide approximately 100 cfm of airflow per extraction well (i.e., 400 cfm total) and that VE-3 and VE-4 will perform similar to VE-1 and VE-2, it can be estimated that emissions from the SVE system at start-up will be at the following levels:

- VOCs: 1.87 pounds per hour (44.83 pounds per 24-hour day)
- Benzene: 0.0058 pounds per hour (50.46 pounds per year)
- Ethylbenzene: 0.32 pounds per hour
- Toluene: 0.24 pounds per hour
- Total xylenes: 1.27 pounds per hour

At these levels, emissions from the proposed SVE system should be significantly below respective *de minimis* levels found in WAC, Chapter NR 445. As remediation progresses, these levels will decrease. Thus, even using conservative assumptions, the estimated total organic compound emissions are below the 5.7-pound-per-hour emission rate requiring a permit application under WAC, Chapter NR 406. However, WAC NR 419.07, will require CCP to file a remediation notification form for the SVE system. WAC NR 419.07 also requires that the following testing and record keeping be conducted:

- Total organic compound emissions will be tested once each day for the first 3 days of operation, weekly for the next 3 weeks, and monthly thereafter.
- For substances listed in Table 3 of WAC NR 445.04, testing will be done once during the first 3 days of operation, once during the third week of operation, and once every 6 months thereafter.

TABLE 1

SUMMARY OF EXHAUST MEASUREMENTS DURING SEPTEMBER 1993 PILOT TEST

Time	Exhaust Analysis (pounds/cubic foot)				Airflow (cfm)	Benzene Emission Rate (LBH)	Total VOC Emission Rate (LBH)
	Benzene	Ethylbenzene	Toluene	Total Xylenes			
VE-1							
09:30	-	-	-	-	45	-	-
10:00	-	7.9E-06	6.1E-06	3.7E-05	44	-	1.4E-01
10:30	-	9.6E-06	8.3E-06	4.1E-05	45	-	1.6E-01
11:00	-	9.2E-06	7.7E-06	4.0E-05	47	-	1.6E-01
11:30	-	7.3E-06	5.1E-06	3.4E-05	44	-	1.2E-01
12:00	-	5.9E-06	4.6E-06	2.8E-05	40	-	9.3E-02
12:15	-	-	-	-	40	-	-
12:25	-	7.3E-06	5.4E-06	3.3E-05	40	-	1.1E-01
Avg:	-	7.9E-06	6.2E-06	3.6E-05	43	-	1.3E-01
VE-2							
12:30	-	-	-	-	34	-	-
01:00	2.0E-07	1.6E-05	1.2E-05	6.2E-05	32	3.9E-04	1.8E-01
01:30	2.3E-07	1.8E-05	1.4E-05	6.9E-05	33	4.5E-04	2.0E-01
02:00	2.4E-07	1.9E-05	1.3E-05	7.0E-05	33	4.7E-04	2.0E-01
02:30	2.8E-07	2.2E-05	1.5E-05	7.7E-05	47	8.0E-04	3.2E-01
03:00	2.7E-07	2.1E-05	1.5e-05	7.8e-05	44	7.1E-04	3.0E-01
03:30	2.2E-07	1.8E-05	1.2E-05	6.4E-05	41	5.4E-04	2.3E-01
Avg:	2.4E-07	1.9E-05	1.4E-05	7.0E-05	38	5.6E-04	2.4E-01

NOTES:

cfm = Cubic feet per minute.
LBH = Pounds per hour.

- Records will be maintained for 3 years quantifying the year-to-date weight of the Section NR 445.04 Table 3 substances remediated.

- Records will be maintained for 3 years listing the calculations and amounts of soil or water remediated.

3.2 Water Discharges

The water generated by the dewatering of the SVE wells will be discharged to a sanitary sewer manhole at the CCP Plant, where it will co-mingle with other pumped groundwater from the ongoing remedial action. CCP has obtained local approval for groundwater discharge to the city wastewater treatment plant.

Section 4

MONITORING AND REPORTING

During startup activities, the system will be monitored each day for the first 3 days and weekly for the next 3 weeks of operation. The system will be monitored on a monthly basis after the startup period. The comprehensive monitoring program will include the following activities:

- Collection of a SVE system exhaust sample for BTEX analysis to evaluate the remediation effectiveness over time.
- Monitoring of soil vacuum and airflow rates from the system
- Adjustment of airflow rates to improve system performance or effectiveness
- Monitoring of individual groundwater recovery well flow rates and the cumulative flow rate

Following startup, a construction documentation report will be prepared according to the requirements of WAC NR 680.08(2). Biannual progress letters will be submitted to the WDNR based on ongoing monitoring of the remedial action. The first progress letter will be submitted 6 months after the SVE system becomes operational, and then every 6 months thereafter until CCP and the WDNR agree that the remediation goal has been attained. Copies of the progress update will be submitted to the Bureau of Solid and Hazardous Waste Management and the WDNR's Southeast District Office. The progress updates will include the following:

- A summary of the operating schedule for the remedial measures, including cycling of the extraction systems, volume of water and an estimate of air volume removed, and estimated flow rates for air (scfm) and groundwater (gpm) being extracted.
- A time/concentration plot indicating the efficiency of the remedial measures. The plot will compare the change in concentrations of SVE emissions over time.
- Recommendations for revisions to the remedial measures, including sampling schedules, monitoring parameters, location of monitoring points, and other items. The report also will include a summary of the significant maintenance/repairs made to the remediation system during the proceeding 6-month period.

- As appropriate and consistent with CCP's plan for determining attainment of the closure remediation goal, a summary of soil contamination analyses, analytical methods used, etc.

- A general narrative explaining the trend observed during the past year and any correlations that can be made with the performance of the system.

CCP will also continue to monitor and evaluate the groundwater remedial action at the plant. Quarterly and annual reports will be submitted to WDNR. These reports will describe ongoing monitoring data, the extent of groundwater impacts, and the effectiveness of the remedial actions.

Section 5

ROUTINE OPERATION AND MAINTENANCE

The well pumps and the vacuum blower will be controlled from a central control panel to be located outside the structure housing the equipment. Under normal conditions, the well pumps and vacuum blower will run under automatic operation. An operator will be present at the system on a periodic basis to perform routine operation and maintenance. The control panel will include alarms to alert the operator to conditions outside the normal range of operation.

Normal operation of the vapor extraction/groundwater extraction system will be as follows:

- Each of the four well pumps will be controlled from hand-off-auto switches. When in the "auto" mode, the pump will operate between high level and low level sensors in the extraction/recovery well. When in the "auto" mode, the well pumps will shut down when the vacuum blower is not operating.
- The vacuum blower will be controlled from a hand-off-auto switch. When in the "auto" mode, the vacuum blower will be shut down when any of the following events occur:
  - Upon a "high temperature" signal from the downstream temperature sensor.
  - Upon a "high pressure" signal from the downstream pressure sensor.
  - Upon a "high-high" signal from the upstream separator tank.
  - During transfer pump operation. The vacuum blower will be automatically restarted when the transfer pump has completely blown down the separator tank.
- The transfer pump on the water separator tanks will be controlled from a hand-off-auto switch. When in the "auto" mode, the pump will operate between high level and low level sensors in the separator tank.

System maintenance will be performed in accordance with instructions provided with each piece of equipment supplied with the system.

Section 6

SCHEDULE FOR CONSTRUCTION AND STARTUP

The intended 1995 schedule of events for the proposed remedial action at CCP's former hazardous waste incinerator is as follows:

Task	Initiation	Completion
Construction Pre-Bid Conference	March 22, 1995	March 22, 1995
Bid Receipt, Evaluation, and Contracting	March 31, 1995	April 14, 1995
Remediation Notification Form (per s. NR 419.07, WAC)	March 31, 1995	April 14, 1995
Construction	May 1, 1995	90 calendar days from date of award
Start-up	Upon Construction Completion	
Construction Documentation Report (per s. NR 680.08(2), WAC)	August 1, 1995	August 30, 1995
First Semiannual Progress Letter	December 1, 1995	December 29, 1995

Section 7

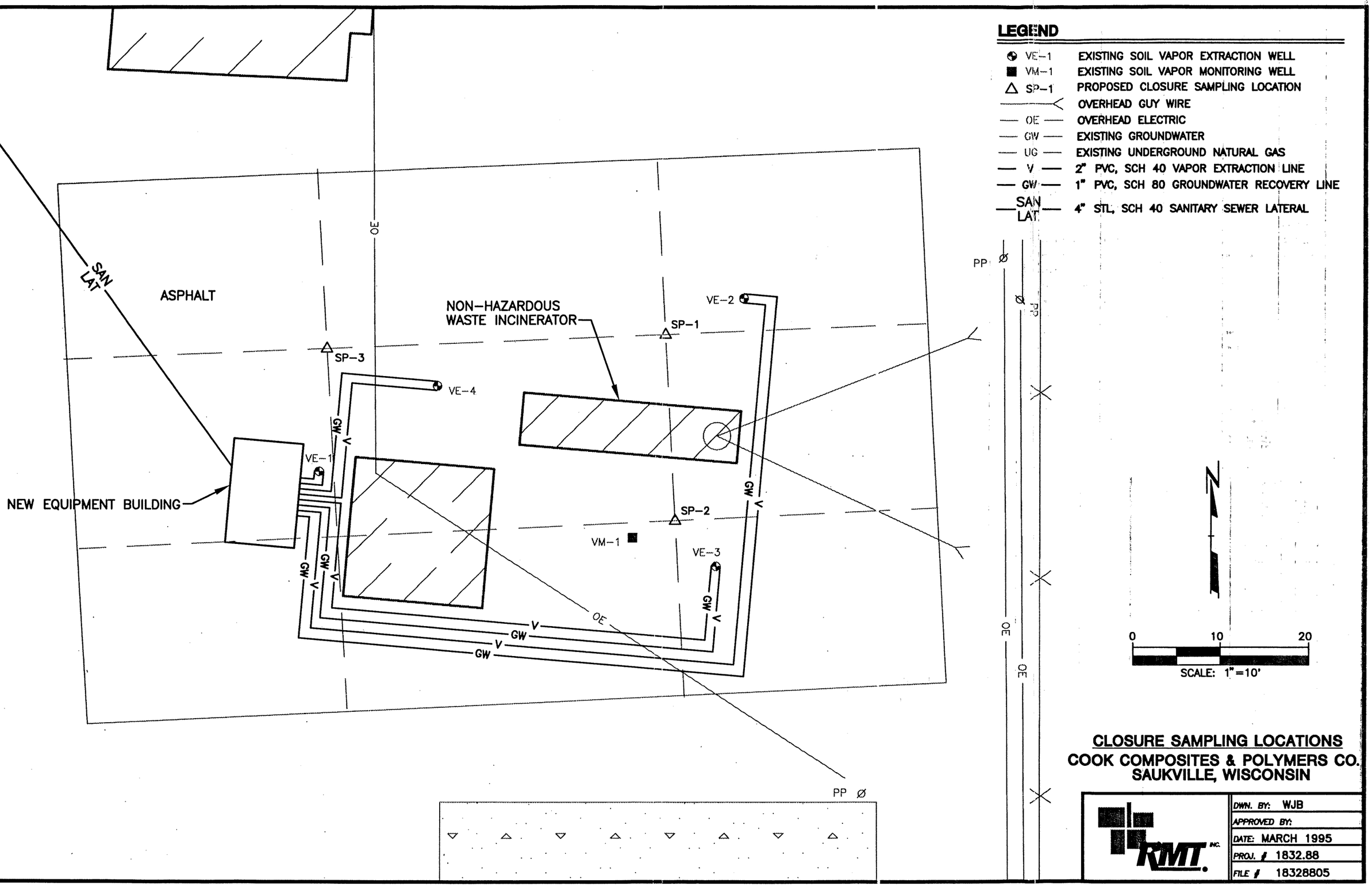
CLOSURE SAMPLING PLAN

The SVE system will be operated until the level of performance achievable though this technology has been obtained. Typically, SVE systems are operated until the monitored exhaust concentrations indicate that significant contaminant removal is no longer achievable. This may require several years of system operation.

At the point that removal is no longer efficient, soil samples will be collected and analyzed to verify that the closure performance standards have been obtained. As proposed in the April 1992 Closure Plan Modification, three soil borings will be advanced within the incinerator area to an approximate depth of 11 feet and continuously sampled at 1.5 feet intervals. Boring locations are shown on Figure 1. The samples will be analyzed for total BTEX, and the results will be compared to the closure goal established in the Closure Plan Modification. The closure goal for the sum of BTEX has been established as 530 mg/kg. Semivolatiles have been determined to not be a factor for achieving closure. The results will be submitted to the WDNR for approval that the hazardous waste closure process has been completed.

LEGEND

VE–1	EXISTING SOIL VAPOR EXTRACTION WELL
VM–1	EXISTING SOIL VAPOR MONITORING WELL
SP–1	PROPOSED CLOSURE SAMPLING LOCATION
	OVERHEAD GUY WIRE
OE	OVERHEAD ELECTRIC
GW	EXISTING GROUNDWATER
UG	EXISTING UNDERGROUND NATURAL GAS
V	2" PVC, SCH 40 VAPOR EXTRACTION LINE
GW	1" PVC, SCH 80 GROUNDWATER RECOVERY LINE
SAN LAT	4" STL, SCH 40 SANITARY SEWER LATERAL



CLOSURE SAMPLING LOCATIONS
COOK COMPOSITES & POLYMERS CO.
SAUKVILLE, WISCONSIN

RMT INC.

DWN. BY:	WJB
APPROVED BY:	
DATE:	MARCH 1995
PROJ. #	1832.88
FILE #	18328805

FIGURE 1

$$DWG$$
$$PRF$$
$$SCALE$$
$$DATE$$

APPENDIX A

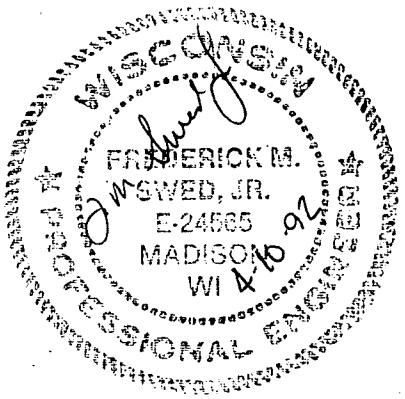
CLOSURE PLAN MODIFICATION (APRIL 1992)

RMT, Inc.
744 Heartland Trail
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444
FAX: 608-831-3334

CLOSURE PLAN MODIFICATION

COOK COMPOSITES & POLYMERS CO.
SAUKVILLE, WISCONSIN

APRIL 1992



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Section 1
INTRODUCTION

1.1 Background

Cook Composites & Polymers (CCP) is pursuing final closure of a former hazardous waste incinerator at the Saukville, Wisconsin, facility. The incinerator was appropriately dismantled and decontaminated in late 1989, but residual soil contamination was left in-place. Since 1949, the Saukville plant has manufactured alkyd, polyester, and urethane synthetic resins. The hazardous wastes generated from this manufacturing process include reaction water, rinse solvent, waste resin, and spill residues. The majority of the waste volume consists of reaction water and rinse solvent. From 1972 up until 1989, these wastes were incinerated in the former liquid hazardous waste incinerator.

The Wisconsin Department of Natural Resources (WDNR) has been overseeing the incinerator closure activities under NR 600 of the Wisconsin Administrative Code. Provided below is an abbreviated history of the documents submitted and the meetings associated with final closure of the incinerator.

- ***Closure Plan (Hatcher-Sayre, 1989) for the interim licensed hazardous waste incinerator.*** The closure plan was approved by the WDNR on September 1989 with the condition that a soil sampling and analysis plan be submitted to document clean closure.

- ***Soil Sampling and Analysis—Container Storage and Tanker Storage Areas, and Area Adjacent to Incinerators (Hatcher-Sayre, 1989).*** This soil sampling plan was submitted to the WDNR but was not executed during closure activities. As a result, clean closure was not certified by the WDNR.

- ***Closure Plan Amendment (Hatcher-Sayre, 1990) and Soil Sampling and Analysis Plan (Hatcher-Sayer, 1990).*** These reports were submitted to determine the soil contamination in the former incinerator area and to propose closure alternatives. The WDNR concluded that the soil sampling plan was not sufficient to determine the degree and extent of contamination at the former incinerator site.

- ***Meeting with the WDNR, CCP, and Hatcher-Sayre (February 28, 1991).*** This meeting was held to clarify the closure requirements. CCP agreed to submit another soil sampling plan with consideration of the WDNR guidance.

- ***Soil Sampling and Analysis Plan—Container Storage/Tanker Storage Areas and Area Adjacent to Incinerators (Hatcher-Sayre, 1991).*** This plan was approved in the WDNR letter dated June 12, 1991. Submittal of a closure plan amendment based on the soil sampling results was requested by the WDNR.

- ***Soil Sampling and Analysis (Hatcher-Sayre, 1991), which presents the soil results and Evaluation of Remedial Options (Hatcher-Sayre, 1991).*** These reports were submitted after completion of the soil sampling activities. The WDNR issued a Notice of Incompleteness (NOI) in a letter dated October 18, 1991, for the Evaluation of Remedial Options report.

- ***Meeting with the WDNR, CCP, and RMT, Inc. (RMT) (December 20, 1991).*** This meeting was held to discuss the NOI and to propose an alternative closure method for remediation of the contaminated soils in the incinerator area. Soil vapor extraction (SVE) was proposed to achieve closure. The WDNR issued a memorandum dated January 28, 1992, which clarified the closure decisions and consequences for CCP. CCP's concerns regarding the closure criteria prompted a meeting request with Paul Didier, Bureau Director of the Hazardous and Solid Waste Department of the WDNR.

- ***Meeting with the WDNR, CCP, and RMT (March 11, 1992).*** This meeting was held to discuss the closure decisions and financial aspects of the final closure activities. The approach discussed for final closure involved *in-situ* soil treatment through SVE. Local background levels for benzene, toluene, ethylbenzene, and xylenes (BTEX) were established as the cleanup criteria. Soil samples from the incinerator area would be collected and analyzed for semivolatiles to determine if a problem existed. If semivolatiles are present, local background levels for semivolatiles would be determined and included as the soil cleanup criteria. The WDNR requested that CCP prepare a closure plan modification, which meets the requirements of NR 645.17 and 665.10, Wisconsin Administrative Code. The WDNR letter dated March 20, 1992, outlined the following specific closure requirements for this site:

  - The local background level for total BTEX was established as 530 mg/kg. Background concentrations for semivolatiles will be established, if necessary, for *in-situ* closure methods.

  - The closure plan modification will include a discussion of a clean closure option, which may be completed in 180 days. The alternative closure method (SVE) will be compared with the clean closure option, as part of the justification for the alternate closure method.

  - Excavated contaminated soil will be handled as a hazardous waste.

  - The closure method must address water quality standards for wetlands and air emission requirements.

- CCP will submit a financial assurance mechanism to cover the operation and maintenance costs for the alternative closure method. Financial assurance must be submitted before operation begins.

Copies of the more recent correspondence between CCP and the WDNR are included in Appendix A.

1.2 Purpose

The purpose of this document is to present a Closure Plan Modification, in conformance with s.NR 645.17 and 665.10, Wisconsin Administrative Code. This Closure Plan Modification addresses the residual soil contamination at the former incinerator area. The proposed alternative closure method is described, which was discussed during the March 11, 1992, meeting with the WDNR. This document justifies the selection of the alternative closure method, in part, through comparison of a closure methodology that can be implemented in 180 days.

1.3 Scope

The scope of this Closure Plan Modification includes the following:

- Justification for the alternative closure method
- Estimation of the volume of hazardous waste in the incinerator area
- Description of the technical approach that will be used to achieve final closure
- Methods for performing and documenting final closure
- Estimation of the closure costs and financial assurance requirements

Section 2

JUSTIFICATION FOR ALTERNATIVE CLOSURE METHOD

2.1 Feasibility of Soil Removal

Residual soil contamination has been left in-place at the former incinerator area. The closure criteria for hazardous waste storage and incinerator facilities (described in NR 640.16 and NR 665.10, respectively) requires the removal of hazardous waste and hazardous waste residuals related to the facility. Therefore, the feasibility of soil removal has been reviewed in development of the Closure Plan Modification.

Appendix B presents an evaluation of closure by removal of the contaminated soil, which may be completed within 180 days. This evaluation was based on the initial evaluation performed by Hatcher-Sayre contained in the Evaluation of Remedial Options (Hatcher-Sayre, 1991). Conclusions concerning the feasibility of the soil removal option include the following:

- Complete removal of the affected soils would require removal of the existing solids incinerator that is currently used by CCP.
- The technical feasibility of excavation is complicated by the presence of active underground utilities, the need to maintain the integrity of nearby structures, and the shallow depth to bedrock that may preclude the installation of sheet piling.
- It is anticipated that high levels of volatile compounds would be released to the air during the excavation activities. Appropriate health and safety precautions would be required for on-site workers.
- The typical cost is approximately 11.9 million dollars, assuming removal and reconstruction of the solids incinerator.

Based on the potential technical infeasibility of excavation, the health and safety concerns, and the relatively high cost, removal and disposal of the soil is not practicable as the remedial technology for this site.

2.2 Feasibility of Alternative Closure Method

The proposed alternative closure method for this site is soil vapor extraction (SVE) combined with paving of the area. Using SVE, volatile compounds are removed from the in-place soil located above the water table by forced or drawn air currents. A vacuum will be applied to the subsurface through wells that are screened in unsaturated soil. Paving will minimize surface water infiltration and direct contact with affected soils. On-going RCRA corrective action activities include groundwater collection beneath the affected soil area. Therefore, the potential for contaminant migration to receptors will be controlled during and after implementation of SVE.

SVE will be effective at this site in reducing the volatile concentrations present in the soil. The soils consist primarily of silt with occasional sand seams. The spacing between the extraction wells and the source vacuums will be designed to achieve coverage of the affected area.

SVE is considered an alternative closure method because closure will take longer than the 180 days that is typically required. To achieve closure, the system is anticipated to be operated over a period of years because of the cohesive soils. SVE is a practical, conventional method of removing volatiles from the unsaturated zone.

In comparison to closure through soil removal, the following observations are made:

- The proposed alternative closure method may be as protective of human health and the environment, considering the absence of potential exposure pathways to receptors. Groundwater is actively being controlled, and direct contact of soils located beneath the pavement will be minimized.
- SVE may be more protective of on-site workers during implementation, since SVE air emissions can be controlled, whereas ambient air emissions cannot be controlled during excavation.
- The alternative closure method will require longer than 180 days, more likely on the order of years, to achieve closure. However, no immediate health risk exists for the residual soil contamination because of the on-going groundwater remediation performed at the site.
- Additional remediation requirements that may exist after closure of the incinerator area will be addressed under the RCRA Corrective Action Program.

- The alternative closure method promotes on-site and in-state treatment of contaminated soils, which is consistent with the WDNR's informal policy for site remediations.

Soil vapor extraction is proposed as an alternative closure method for the following reasons:

- The method is protective of human health and the environment.
- The method will comply with state and federal standards.
- The method consists of a practical, proven technology.
- The method is capable of achieving final closure.

Section 3
CLOSURE PERFORMANCE STANDARDS

3.1 Local Background Levels

The closure performance standards for soil will consist of achieving the local background concentration for total BTEX and for semivolatiles, if semivolatiles are present at the incinerator area. The former hazardous waste incinerator area was located next to the former urethane production laboratory. In the late 1950s, laboratory wastes were applied to surface soils located adjacent to the incinerator area. The laboratory wastes consisted primarily of xylenes and reaction water. An estimated 10 to 15 gallons per week of laboratory wastes were land-applied from November 1959 to July 1961. In addition, tank spills and other past facility disposal practices may have affected site soils in the area.

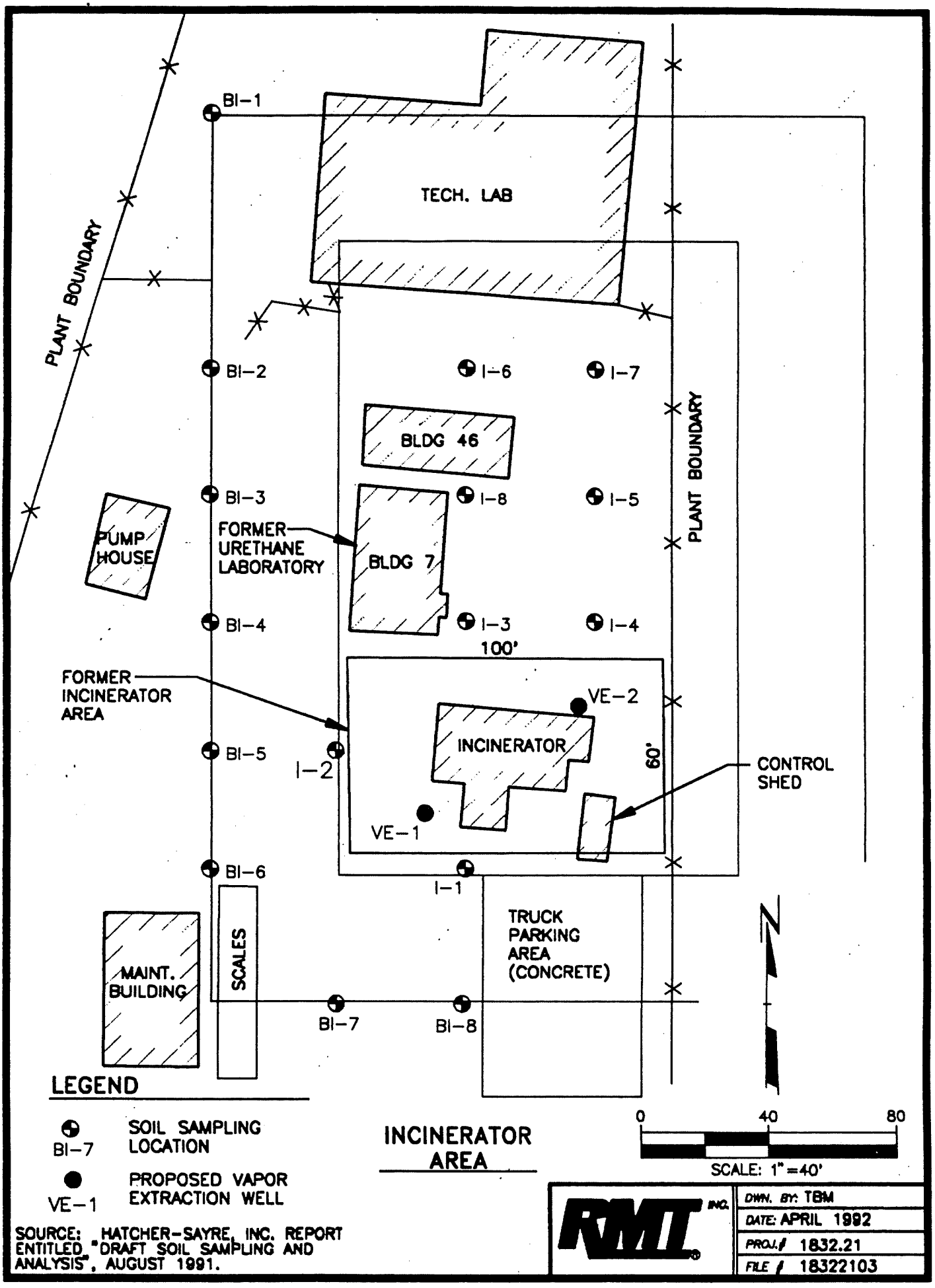
During the 1991 soil investigation performed by Hatcher-Sayre, BTEX compounds were detected in the soil near the former laboratory as well as the incinerator area (refer to Figure 3-1). BTEX from historical laboratory applications or general spills may have encroached on the incinerator closure area.

3.1.1 BTEX

Figure 3-1 illustrates the location of the soil borings that were sampled and analyzed by Hatcher-Sayre in 1991. Table 3-1 summarizes the total BTEX levels detected in soil at the former incinerator area, former urethane laboratory disposal area, and the surrounding area. The average concentration of total BTEX detected at the incinerator area was 1,250 mg/kg. On average, 530 mg/kg of total BTEX was detected as background (defined as the laboratory disposal area and surrounding area). In consideration of the site-wide contamination and a disposal practices at the former urethane laboratory, the WDNR has established the local background level for total BTEX at 530 mg/kg.

3.1.2 Semivolatiles

The Soil Sampling Plan (Hatcher-Sayre, 1991), approved by the Department focused on BTEX characterization of the soils and limited semivolatile characterization of soils



APR 14 1992

FIGURE 3-1

TABLE 3-1

TOTAL BTEX LEVELS
(mg/kg)

Sample Depth (feet)	Incinerator Area		Urethane Laboratory Disposal Area				Surrounding Area									
	I-1	I-2	I-3	I-4	I-5	I-7	I-6	I-8	BI-1	BI-2	BI-3	BI-4	BI-5	BI-6	BI-7	BI-8
1.5 - 3.0	13	2	974	459	310	0.6	0.006	0.016	0.004*	0.83	0.2	0.18	0.34	0.004*	0.004*	0.18
4.5 - 6.0	9,600	2.6	16,300	760	940	7,330	4	0.004*	0.004*	0.28	0.004*	0.004*	0.004*	0.008	0.02	104
7.5 - 9.0	261	93	399	105	71	110	0.02	6.7	0.004*	0.26	0.004*	0.004*	0.011	0.008	27	28
9.5 - 11.0	50	0.019	396	95	51	762	0.044	6.7	0.004*	12.8	0.004*	NR	0.004*	0.01	50	49
AVERAGE (over depth of boring)	2,481	24	4,517	354	343	2,051	4	3	0.004*	3.5	0.05	0.06	0.09	0.007	19	45
AVERAGE (for area)	1,252		1,816				7.5									
AVERAGE FOR BACKGROUND AREAS	**534**															

Notes:

1. The BTEX results are from the draft Soil Sampling and Analysis Plan (Hatcher-Sayre, 1991).
2. Total BTEX represents the sum of the reported results for benzene, toluene, ethylbenzene, and xylenes at a given sample depth.
3. Values marked by an asterisk reflect the reporting limit for the BTEX analyses.
4. NR = No Result; no sample was obtained at this depth in boring BI-4 due to auger and sampler refusal.
5. The local background level for total BTEX has been established as 530 mg/kg by the WDNR during the March 11, 1992, meeting.

within the incinerator area. These contaminants were selected for analysis because they were representative of the wastes burned in the incinerator. Limited semivolatile characterization was performed because of the lower mobility of these compounds. Soil boring I-4, located at the former urethane laboratory disposal area, was sampled and analyzed for semivolatiles. Table 3-2 presents the results for total semivolatiles detected I-4. The semivolatile concentrations detected ranged from approximately 30 to 180 mg/kg, with an average level of about 90 mg/kg.

Additional site characterization is required for semivolatiles at the incinerator area to determine if these constituents are present. In addition, background levels will be established for semivolatiles. If a problem exists, the background levels of semivolatiles will be established as the cleanup criteria; similar to the approach used for BTEX.

A total of four soil borings will be continuously sampled through the vadose zone to a depth of approximately 10 to 12 feet below the surface. Two borings will be advanced at the incinerator area, and two borings will be located at the urethane laboratory disposal area for background comparison. Soil samples will be analyzed for HSL semivolatiles using USEPA Method 8270. Appendix C presents the soil sampling methods.

3.2 Incinerator Area and Volume of Hazardous Waste

Figure 3-2 illustrates the former hazardous waste incinerator area from CCP's 1983 Part B Permit Application report, prepared by Freeman Chemical Company (the former company name for CCP).

The area of former incinerator operations and storage of hazardous waste is based on Figure 3-2 and the history of the incinerator operation as recalled by plant personnel. The incinerator area is defined by these historical records because disposal practices at the former laboratory have significantly impacted surrounding soil areas with similar wastes.

TABLE 3-2

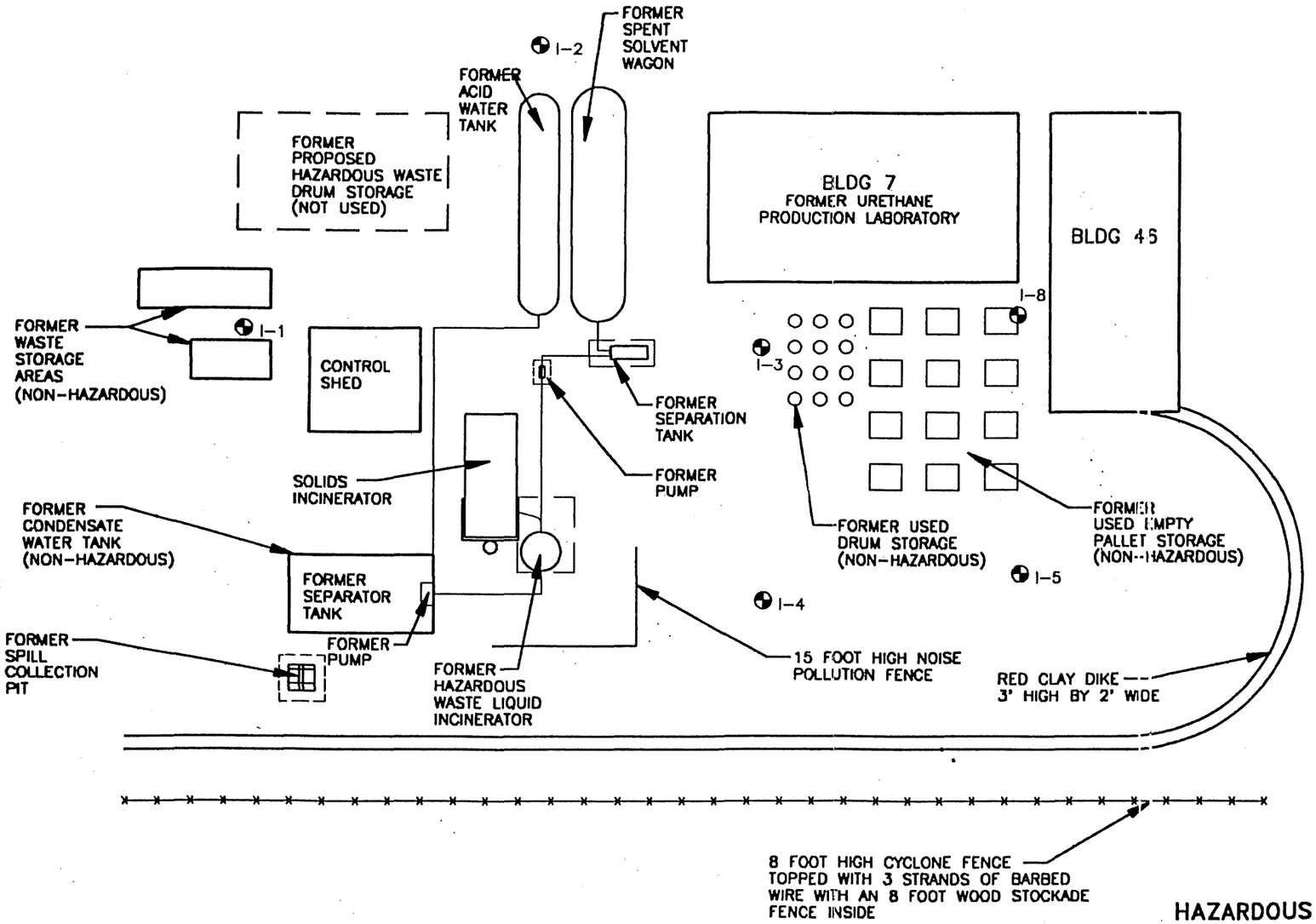
TOTAL SEMIVOLATILE LEVELS
(mg/kg)

Sample Depth (feet)	Urethane Laboratory Disposal Area
	I-4
1.5 - 3.0	28.8
4.5 - 6.0	183.9
7.5 - 9.0	132
9.5 - 11.0	37
Average (over depth of boring)	95

Notes:

[1] The semivolatiles results are from the draft Soil Sampling and Analysis Plan (Hatcher-Sayre, 1991).

[2] Total semivolatiles represents the sum of the reported results for the identified semivolatile compounds.



LEGEND

POTENTIAL SPILL AREA

I-5 APPROXIMATE SOIL BORING LOCATION

FENCE

N

0 20 40

SCALE: 1"=20'

SOURCE: FREEMAN CHEMICAL RCRA PART B APPLICATION.
RECEIVED AT USEPA REGION V 2/17/83
RECEIVED AT WDNR 3/3/83 (COPY 7)
MODIFIED PER CRAIG BOSTWICK/CCP 12/91

HAZARDOUS WASTE INCINERATOR AREA
FEBRUARY 9, 1983

COOK COMPOSITES & POLYMERS

RMT, INC.

DWN. BY:	TBM
DATE:	APRIL 1992
PROJ.#	1832.21
FILE #	18322102

APR 14 1992

FIGURE 3-2

The incinerator area includes approximate 6,000 square feet. The area dimensions are defined as 100 feet east-west and 60 feet north-south. This area is based on inclusion of the potential spill areas from the liquids incinerator, hazardous liquids storage tanks, and distribution piping and pumps. This area is slightly less than the area of attainment proposed for engineering design of the SVE system during the December 20, 1991, meeting between CCP, RMT, and the WDNR. The previous estimate was not carefully measured from Figure 3-2, but rather was approximated to Hatcher-Sayre's east-west boring grid boundary shown on Figure 3-1 (distance of 105 feet).

Soils were determined to be impacted to an 11-foot depth below the surface, or just above the local water table. The hazardous waste volume assumes an 11-foot thickness of impacted soil. Approximately 2,400 cubic years of impacted soil are estimated for the incinerator area.

3.3 Method of Satisfying Closure Performance Standards

The method of achieving the closure performance standards is implementation of an *in-situ* soil vapor extraction system. The incinerator area soils will be treated in-place through SVE to achieve local background levels for total BTEX (530 mg/kg) and semivolatiles, if required by the WDNR. Final closure of the site will also include paving the incinerator area to minimize the potential for direct contact of contaminated soil, and to minimize surface water infiltration. Groundwater is actively being remediated under the RCRA corrective action program at the site. Shallow groundwater beneath the incinerator area is captured and discharged to the Village of Saukville POTW.

Section 4
DESCRIPTION OF SOIL VAPOR EXTRACTION SYSTEM

4.1 Remedial Design Objective

The results of the previous site investigation indicate that BTEX compounds are present in soil located above the water table, as a result of facility operations. The remedial objective is to remove BTEX compounds from unsaturated soil within the incinerator area. An SVE system combined with surface paving will provide an effective means of controlling the source of BTEX loading to the water table, while ongoing groundwater recovery under RCRA will control off-site migration. Available data and assumptions used to develop a pilot-scale test for SVE are listed in Table 4-1.

4.2 Pilot-Scale Test

The objectives of the pilot-scale SVE test are to evaluate the effectiveness of SVE at the site and to obtain airflow and off-gas chemistry data for design of a full-scale system. The incinerator area will be paved prior to pilot-scale testing to enhance the vacuum developed in the soil, and to represent full-scale conditions.

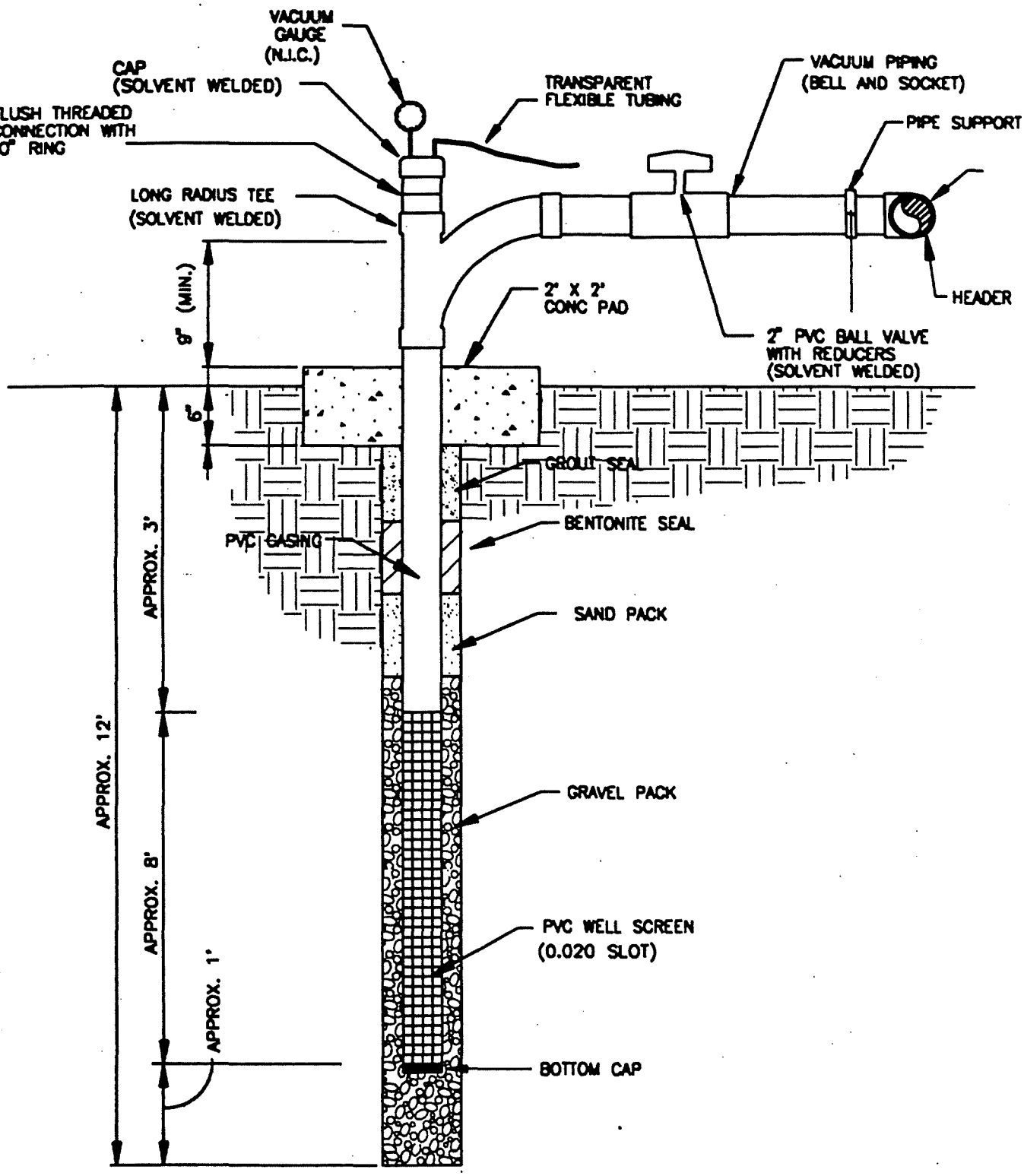
The soil vacuum extraction system will include vertical wells screened in the unsaturated soil zone of the incinerator area. Initially, two 4-inch PVC wells will be installed at the approximate locations shown on Figure 3-1. A typical vacuum extraction well detail is illustrated on Figure 4-1. The SVE wells will be screened through the profile of unsaturated soil. The well heads and piping will be located above ground to avoid the underground utilities. One or two observation wells will also be installed for the purpose of monitoring soil vacuum. During installation of the SVE wells, soil samples will be collected and analyzed to determine the initial concentrations of BTEX and semivolatiles in the soil. Physical soil characteristics will also be determined, including Atterberg limits, grain-size distribution, and moisture content. Soil sampling methods are described in Appendix C.

A pilot-scale test will be performed on the vacuum extraction wells. Each test is typically 1 to 3 hours long. A portable blower system will be connected to each well for individual testing. During each test, off-gas samples will be collected and analyzed by RMT Laboratories using a

TABLE 4-1

REMEDIAL DESIGN BASIS

Media	Parameter	Value or Estimate	Basis
Unsaturated Soil	Soil Type	Silt (ML) and Silty Clay (CL-ML) with occasional silty sand and gravel seams	Typical, based on Hatcher-Sayre soil boring logs.
	Depth of detectable BTEX	Approximately 11 feet below the surface	Based on Hatcher-Sayre soil sampling results.
	Depth to water table	Approximately 8 to 10 feet below the surface	Based on quarterly water table maps and soil moisture observed during Hatcher-Sayre soil investigation.
	Affected soil area	Approximately 6,000 ft^2 (refer to Figure 3-1 and Figure 3-2)	Based on CCP historical records of incinerator operation.
	Affected Soil Volume	Approximately 2,400 yd^3	Calculated from depth of detectable BTEX and incinerator area.
Bedrock	Bedrock Type	Dolomite	Based on previous site investigations by Hatcher-Sayre
	Depth to Bedrock	Approximately 15 to 20 feet below the surface	Estimated from as-built drawing of Ranney Collector 3 (Hatcher-Sayre, 1986).



TYPICAL VAPOR EXTRACTION WELL

(NOT TO SCALE)

RMT INC.	DWN. BY: TBM
	DATE: APRIL 1992
	PROJ.# 1832.21
	FILE # 18322104

APR 14 1992

FIGURE 4-1

portable gas chromatograph. The off-gas composition will be quantified as lbs/ft^3 air for benzene, toluene, ethylbenzene, and xylenes (BTEX). For each test, measurements will be taken to calculate the airflow rate from the SVE well. During each test, vacuum measurements will be made at the remaining SVE well and observation well locations. The vacuum measurements will be used to evaluate the extent of influence from the applied vacuum.

The results of the SVE pilot test will be provided to the WDNR in a letter report which will include a description of the test, discussion of results, recommendations, and attached data. The method of off-gas treatment will be presented, if the operating off-gas concentrations will exceed the regulatory discharge limits.

4.3 Full-Scale Design, Operation, Maintenance, and Monitoring of System

The results of the SVE pilot test will be used to design a full-scale system. Additional vacuum extraction wells may be installed if the influence of the initial wells is inadequate. The design will allow the wells connected to the blower to be operated alone or in combination, depending on potential changes in off-gas quality.

The full-scale system will consist of the following components:

- Additional vacuum extraction wells, if required
- Above-grade piping to connect the wells
- A common blower and motor
- Site improvements to accommodate the blower, motor, and controls (electrical service, small enclosure)
- Instrumentation to measure the airflow rate and sampling ports to collect off-gas samples
- Discharge piping and stack
- Air treatment unit, if required

As previously discussed, the area will be paved prior to pilot-scale testing. Benefits from paving the area include the following:

- Minimizing surface infiltration and potential contaminant leaching from the source area.
- Providing a better work environment for plant personnel by controlling surface water ponding
- Minimizing direct contact with impacted soil
- Improving performance of the SVE system by reducing ambient air intrusion

During full-scale operation of the soil vacuum extraction system, on-site plant personnel will observe the equipment to determine its operational status. As needed, staff will be called in to perform general maintenance.

During start-up activities, the system will be monitored on a weekly basis for the first 3 weeks of operation. The system will be monitored on a monthly basis after the start-up period. The comprehensive monitoring program will include the following activities:

- Collection of a soil vacuum extraction system off-gas sample for BTEX analysis to evaluate remediation effectiveness over time
- Monitoring of soil vacuum and airflow rates from the system
- Adjustment of airflow rates to improve system performance or effectiveness

Quarterly progress letters will be submitted to the WDNR based on ongoing monitoring of the remedial action. The progress update will include the following:

- Soil vacuum and airflow measurements from the SVE system
- Cumulative recovery of volatile constituents from the unsaturated zone
- Evaluation of system effectiveness, hydraulic control, and operating conditions
- Recommendations for operational modification, if necessary

The length of time required for closure is unknown, but is anticipated to be roughly 3 years because of the silty soils. As remediation at the CCP site continues, the frequency of the system monitoring may be reduced based on the rate of reduction of off-gas concentration, after consultation with the WDNR.

4.4 Documentation Procedures for Achieving Closure Performance Standards

The SVE system will be operated until the level of performance achievable through this technology has been obtained. Typically, SVE systems are operated until the monitored off-gas concentrations indicate that significant contaminant removal is no longer achievable. At this point, soil samples will be collected and analyzed to verify that the closure performance standards have been obtained.

Three soil borings will be advanced within the incinerator area to an approximate 11-foot depth and continuously sampled at 1 1/2-foot intervals. Soil chemistry results will be compared to local background levels for total BTEX (and semivolatiles, if necessary).

Closure documentation will be presented to the WDNR through a Closure Documentation Report. Once closure is approved by the WDNR, the SVE wells and observation wells will be properly abandoned. Long-term care for this site is not anticipated.

4.5 Compliance with Regulatory Requirements

The closure remedy will be implemented in accordance with applicable state and federal requirements, as discussed below.

Compliance with Air Emissions Requirements

The need for SVE off-gas treatment will be assessed during the pilot-scale study. According to s.NR 406.04, total VOCs discharged in excess of 5.7 lb/hr will require a WDNR permit and total VOCs discharged in excess of 9.0 lb/hr will require treatment of the gas stream. Total VOCs will be calculated as the sum of the BTEX compounds.

In addition, s.NR 445.04 requires total benzene discharges to the atmosphere of less than 300 lbs/year. Applicable sections of NR 419 will also be complied with for control of organic compound emissions.

Compliance with Water Quality Standards for Wetlands

The SVE activity proposed for closure of the incinerator area will not affect wetlands, even if wetlands were present beyond the site property boundaries. The Department was contacted regarding compliance with Ch. NR 103, Wisconsin Administrative Code. In discussions with Pat Trochlell and Dave Siebert of the Water Regulations and Zoning Department, it was determined that Ch. NR 103 does not apply for this site.

Compliance with Groundwater Requirements

Groundwater exceedances are reported in the vicinity of the incinerator area, which is included in the site's groundwater contamination plume. Groundwater remediation activities are currently being addressed under the RCRA Corrective Action Program.

Health and Safety Requirements

A site-specific Health and Safety Plan will be developed prior to closure activities. The plan will be developed in compliance with applicable federal, state, and local requirements.

Decontamination of Equipment

At the completion of field activities, the equipment will be appropriately decontaminated using a high-pressure spray wash. Decontamination residuals and drill cuttings will be collected and stored in 55-gallon DOT-approved barrels. Test sample results will determine the method of disposal for the decontamination and drilling residuals. Wastes will be handled, stored, and disposed in compliance with applicable state and federal requirements.

Section 5
COST OF CLOSURE

The preliminary cost for the alternative closure method is presented in Table 5-1. Approximately $291,000 is estimated for installation, 3 years of operation and maintenance, and documentation of closure. The estimate assumes that gas treatment will not be required.

Financial Assurance

As discussed in the WDNR letter dated March 20, 1992, CCP must provide financial assurance to cover the cost of the closure method's operation and maintenance. The required financial assurance amount is $108,000. Financial assurance will be secured by CCP before full-scale operation of the SVE system begins.

TABLE 5-1

PRELIMINARY COST FOR CLOSURE BY SOIL VAPOR EXTRACTION

1.	Well Installation & Analytical[1]	$ 38,000
2.	Pilot-Scale Study & Report[2]	8,000
3.	Full-Scale Design[3]	7,000
4.	Equipment & Control Housing[4]	50,000
5.	Paving[5]	10,000
6.	System Start-up (First Month Sampling)[6]	13,000
7.	Monthly System Inspection, Monitoring, Operation, and Quarterly Letter Report[7]	108,000
8.	Documentation of Closure[8]	31,000
	SUBTOTAL	$265,000
	10% Contingency	26,000
	TOTAL	**$291,000**

ASSUMPTIONS:

1 Includes installation of 2 SVE wells and 2 vacuum monitoring wells. Ten soil samples characterized for BTEX at $235 per sample. Twenty soil samples characterized for HSL semivolatiles at $640 per sample.

2 Includes two pilot-scale tests, each 4 hours long.

3 Assumes no additional SVE wells nor off-gas treatment is required. Assumes the incinerator area does not require remediation for semivolatiles, or other constituents.

4 Includes 1 blower and air/water separator at $10,000 L.S., piping and mechanical installation at $15,000 L.S., instrumentation at $15,000 L.S., and control housing at $10,000 L.S.

5 Paving 666 s.y. at $15 per s.y.

6 Start-up activities include monitoring for the first 3 days of operation and weekly inspections and monitoring for the next 3 weeks of operation.

7 Assumes 3 years of operation and maintenance at $36,000 per year; includes twelve quarterly reports prepared for the WDNR.

8 Assumes closure is achieved by SVE for total BTEX compounds. Includes analysis of 20 soil samples at $235 per sample and preparation of documentation report.

Section 6
SCHEDULE

The schedule milestones for implementing the alternative closure method are presented below.

Task No.	Task Description	Completion Date
1	Well installation and soil sampling	60 days after WDNR approval of the Closure Plan Modification
2	Pilot-scale study report	45 days after completion of Task 1
3	Full-scale system design and installation	60 days after receipt of the WDNR's comments on Pilot-Scale Report
4	System start-up activities*	Completed 30 days after system startup
5	System monitoring, operation, and maintenance	On-going

* CCP will secure financial assurance for O&M ($108,000) prior to system start-up.

Section 7

REFERENCES

Hatcher-Sayre. 1986. Task 1 - Site conditions report.

Hatcher-Sayre. 1990. Closure plan.

Hatcher-Sayre. 1990. Closure plan amendment.

Hatcher-Sayre. 1990. Soil sampling and analysis plan.

Hatcher-Sayre. 1991. Soil sampling and analysis plan; container storage/tanker storage areas and area adjacent to incinerators.

Hatcher-Sayre. 1991. Draft soil sampling and analysis plan.

Hatcher-Sayre. 1991. Evaluation of remedial options.

Wisconsin Department of Natural Resources. 1991. Memorandum entitled, Guidance on air sampling and emission monitoring for LUST soil and groundwater remediation projects with a synopsis of air regulations.

APPENDIX A

CORRESPONDENCE

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: January 28, 1992

FILE REF: 246004330
Ozaukee
HW/LIC

TO: Cook Composites & Polymers' Licensing File

FROM: Tim Mulholland - SW/3

SUBJECT: Closure Decisions and Consequences for CCP

Recent Departmental discussions about Cook Composites' and Polymers' (CCP) closure activities have yielded several interesting questions and issues. It is the purpose of this memo to address some of these questions and issues, so that these issues are apparent to all parties involved.

Situation

CCP is closing a former hazardous waste incinerator. This former incinerator is located in the northern third of the facility and near to production laboratories. The incinerator was appropriately dismantled and decontaminated in late 1989, but residual soil contamination was left. At present this former incinerator is roughly defined as an area of approximately 105' x 60'. This area is contaminated with BTEX (analyses for other compounds have not been performed) as determined in a summer 1991 survey. Outside of the former incinerator area is contaminated soil and ground water. The contamination beyond the incinerator area is assumed to be due to activities associated with the facility in general and not with specific waste handling practices at the former incinerator. The site-wide contamination will be addressed under RCRA Corrective Action, as administered by USEPA-Region V.

Discussions have been held with CCP and their consultant, RMT, to determine the acceptable closure strategy. Due to financial circumstances, CCP does not believe that it can afford a costly remediation plan. In addition, the facility is concerned about the overlap (or lack thereof) of WDNR's closure activities at the former incinerator and the Federal Corrective Action activities throughout the facility. It is difficult for CCP to understand why site-wide and former incinerator contamination cannot be addressed under a single program. As CCP has been told, these are two separate activities occurring under two separate State and Federal authorities. The DNR is trying to coordinate the two activities so that redundant activities are not required.

Hazardous waste facility closure standards require that residual contamination be reduced to non-detectable concentrations for synthetic compounds and to background concentrations for naturally-occurring compounds for a facility to be "closed." (Refer to s. NR 665.10(1), Wis. Adm. Code, for incinerators in particular.) CCP believes that this is a difficult standard to meet, especially when the site-wide contamination is considered. Therefore, the Department will allow CCP to reduce contamination to local background levels (i.e., synthetic chemical contamination may remain in the former incinerator area at background concentrations found beyond the incinerator area). The Department assumes that the former incinerator's residual contamination will then be addressed under Corrective Action.

The Department has also allowed CCP to consider an "alternative" closure strategy for this former incinerator. This closure strategy is called "alternative" because it allows CCP to take longer than the 180 days that is typically expected for a closure period. To pursue alternative closure options, CCP must comply with the following requirements, as listed in an October 18, 1991 NOI for the former incinerator investigation:

- The option must be legitimate;

- The option must be capable of achieving or nearly achieving clean closure;
- The option must be protective of human health and the environment during and after implementation;
- The option must establish effective institutional or other controls over the hazardous waste contamination;
- The option must provide financial assurance in the event that the alternative proves to be ineffective; and,
- The option must comply with the Department's waste management standards.

CCP and RMT have proposed soil-vapor extraction (SVE) to remove BTEX and other volatile compounds. BTEX and other volatile compounds are the most mobile contaminants at this facility and are of the greatest concern to the facility and community. This closure strategy will allow CCP to reduce the most mobile contaminants, and thus reduce a major source of site-wide contamination.

However, since an incomplete investigation has been performed (primarily BTEX analyses have been performed; 1,2-dichlorobenzene, naphthalene, benzoic acid, and phenol have also been detected several feet to the north of the incinerator area) and the DNR does not know what additional contaminants may be present, the DNR remains concerned that the proposed closure strategy may not be sufficient. It is difficult for the agency to pacify CCP's concerns about future closure potentialities since the situation has not been completely characterized. It appears that CCP would like the Department to verify the facility as closed once remediation via SVE is complete. However, since the Department is not certain of all the contaminants that may be present, this assurance cannot be provided based on existing knowledge. There is also the assumption by CCP/RMT that SVE will be effective in this situation, which has not been proven.

One of CCP's and RMT's major concerns is the closure goal. As noted earlier, the usual closure standard is no-detect/background, but in this situation, the Department will use local background for the synthetic contaminants. After the summer 1991 sampling and analyses, the local background beyond the former incinerator area was roughly determined to be 10 mg/kg BTEX. This is the final BTEX concentration in the incinerator area that CCP/RMT have been told they should achieve as the closure goal without further analyses or proposals. RMT believes that this degree of remediation may not be achievable with SVE, and is more comfortable with a closure goal of about 100 mg/kg BTEX.

RMT has proposed a risk assessment to demonstrate that a closure goal higher than that proposed by the Department would not be harmful to human and environmental health, considering that this is an industrial setting with limited exposure paths. RMT has been told that the Department has no mechanism for accepting or reviewing a risk assessment in this situation since the closure performance standard is clearly the removal of all hazardous waste residues to no-detect/background levels. Residual contamination at greater than background concentrations is not acceptable under current regulations and policies, and RMT has been informed of this position.

The point has been clearly made to RMT that CCP's position of using SVE to remove the volatile contamination beneath the former incinerator may not sufficiently address the closure of this site. Since complete investigation for inorganic and semi-volatile organic contamination has not been performed, CCP cannot state with certainty what contaminants are present in the former incinerator area. Since CCP does not know what contaminants are present, it cannot be represented that SVE will be sufficient to remove all contamination. It is known that SVE will likely address the bulk of the volatile contamination that is known to be present.

By pursuing closure activities that use only SVE as the decontamination method, CCP is assuming a degree of risk and should be aware of the Department's concerns with their position. Specifically, if SVE is employed and the closure goal is not met, then further closure activities will be necessary. Similarly, if other

types of contamination are present that are not amenable to SVE, then further closure activities will be necessary that concentrate on those remaining contaminants.

In CCP's favor is the evolution of hazardous waste regulation and the corrective action process at this facility. Unfortunately, this evolution is slow. On the issue of changes to hazardous waste facility closure requirements, recent policy memoranda from the USEPA have noted that risk assessments may be acceptable under certain Federal remedial/closure circumstances. While the Wisconsin Department of Natural Resources has not thoroughly reviewed this position or adopted it, it is likely that this issue will be considered in the future.

Even though this regulatory evolution occurs, with an unpredictable rate and direction, CCP should address all contamination at the former incinerator area at this time. The Department expects closure activities to consider all contamination, and investigations necessary to determine extent and degree of all contamination, without putting closure activities off until some future time, with hopes based on future regulatory or financial conditions. If this was the case, then the Department would be in the position of managing numerous on-going closure activities while facilities waited until an indeterminate future time for changes in hazardous waste regulations or owner finances that would make hazardous waste facility closure more palatable.

This memo has been prepared to consider the possible implications of CCP's potential positions so that the Department, CCP and RMT are all aware of some of the conceivable consequences of these positions.

cc: J. Fermanich/E. Lynch - SW/3
C. Bostwick - CCP
J. Rickun/S. McAnulty/T. Stolzenburg - RMT

TSM8\CCP\ISSCLOSE.CCP

CCP
Cook Composites and Polymers

Headquarters
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Kansas City MO 64141-6389
(816) 391-6000
FAX (816) 391-6215

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217 Freeman Drive
P O Box 996
Port Washington WI 53074
(414) 284-5541
FAX (414) 284-7519

February 27, 1992

Mr. Paul Didier
Bureau Director
Wisconsin Department of Natural Resources
101 South Webster Street
Madison, Wisconsin 53707

RE: Request to Discuss Closure Decisions for the Former Hazardous Waste Incinerator at Cook Composites & Polymers' Saukville facility

Dear Mr. Didier:

Cook Composites & Polymers' (CCPs') (formerly Freeman Chemical Corporation) facility located in Saukville, Wisconsin, manufactures synthetic resin products. Site-wide groundwater and soil contamination at this site is actively being remediated through RCRA Corrective Action. Under the Wisconsin Administrative Code, our former hazardous waste incinerator was appropriately dismantled and decontaminated late in 1989, but residual soil contamination was left in place. The former incinerator (Figure 1) was used to burn reaction water and listed hazardous waste (see Appendix I).

We have requested a meeting with you on March 11, 1992, to discuss the financial and technical aspects of the closure decisions for our former hazardous waste incinerator. The Department's selection of cleanup goals will significantly impact our plant operations. Likewise, financial assurance requirements to implement the remedy may present difficulties for CCP because of our financial position. CCP is prepared to discuss these financial aspects in more detail with you during our meeting, whereas RMT will elaborate on technical issues on our behalf.

The closure decisions and background information for the site are documented in the WDNR memorandum dated January 28, 1992, by Tim Mulholland (enclosed for your review). We have been working with Mr. Mulholland and Ms. Jill Fermanich to resolve the residual soil problems at the site, and we greatly appreciate their efforts in clarifying the closure requirements. However, several technical issues require further discussion because of the impacts to soil from past disposal practices surrounding the incinerator area. Therefore, these issues are presented below for your consideration.

Establishing Local Background Levels for Synthetic Chemical Contamination in Soils

The former incinerator area was located next to our former urethane production laboratory. In the late 1950s, laboratory wastes were applied to surface soils located adjacent to the incinerator area. The laboratory wastes consisted primarily of xylenes and reaction water. An estimated 10 to 15 gallons per week of laboratory wastes were land applied from November 1959 to July 1961. In addition, tank spills and other past facility disposal practices may have affected site soils in the area.

In consideration of the site-wide contamination, the Department indicated that CCP could reduce soil contamination in the incinerator area to local background concentrations. In doing so, the Department assumes correctly that residual soil contamination will be addressed under RCRA Corrective Action. In fact, our objective is to develop a fully integrated remedy for contaminated soil at the site under RCRA Corrective Action.

Our challenge is to determine local background levels at this site, which has a complex history of facility disposal practices. BTEX (benzene, toluene, ethylbenzene, and xylene) compounds were detected in the soil at the laboratory area as well as the incinerator area. However, records clearly indicate that the incinerator operations were limited to a well-defined area of approximately 56 feet north-south and 64 feet east-west. BTEX from historical laboratory applications or general area spills may have encroached on the incinerator closure area. Unfortunately, the Soil Sampling and Analysis Report (Hatcher-Sayre, 1991) included the laboratory disposal area as part of what they called the incinerator area, rather than as part of local background. As a result, their estimation of background levels for total BTEX excludes the historical contributions of laboratory practices that caused elevated BTEX in the area. As Table 1 shows, when the laboratory area is included as part of background, soil concentrations for total BTEX range from 0.01 to 16,300 mg/kg, with an arithmetic mean of approximately 1,200 mg/kg.

We propose to establish a representative local background concentration based on inclusion of the historical contributions of BTEX to the areal concentrations. Existing soil results for total BTEX will be used, and, if necessary, additional soil sampling will be performed to demonstrate the site-wide nature of soil contamination at the facility.

Nature of Contaminants Present at The Incinerator Area

A second important issue is the decision by the Department in the memorandum dated January 28, 1992, that all potential chemical contamination at the former incinerator area be addressed, including inorganic and semivolatile organics. Additional characterization for semivolatiles and inorganics is apparently being requested if the remedy selected does not ensure the destruction of such compounds.

The Soil Sampling Plan (Hatcher-Sayre, 1991), approved by the Department on June 12, 1991, focused on BTEX characterization of the soils and limited semivolatile characterization of soils within the incinerator area. These contaminants were selected for analysis because they were representative of the wastes burned in the incinerator. Limited semivolatile characterization was performed because of the lower mobility of these compounds. Metals and PCBs were not analyzed because these compounds were not known to be burned in the incinerator. Therefore, additional soil characterization for metals and PCBs is not appropriate for closure of the incinerator area.

If additional site characterization is required for semivolatiles, we would propose establishing the local background levels as the cleanup criteria; similar to the approach used for BTEX. Alternatively, additional site characterization could be integrated into the RCRA Corrective Action soil sampling activities, which have not yet been initiated.

Proposed Actions

Our proposed remedy is soil vapor extraction (SVE), combined with pavement of the incinerator area, to minimize surface water infiltration. In-place treatment is consistent with the Department's preference for on-site and in-state treatment or disposal of wastes. Short of complete excavation and removal, SVE is the most effective and practical remedial action for volatile organic compounds in the vadose zone. Under RCRA Corrective Action, we are operating a groundwater pumping system that effectively captures and controls the contaminant plume originating from the facility. For these reasons, and the fact that local background is elevated for BTEX, we are asking that the Department consider the following approach to achieve clean closure at the incinerator area.

1. **Establish Local Background Conditions**
   Perform additional soil analyses for contaminants associated with the former incinerator operation, and develop representative local background levels.

2. **Implement SVE and Attempt to Achieve Local Background Levels**
   Operate SVE until the technology has achieved its performance level. Sample and analyze soils to determine if local background conditions are achieved.

3. **If SVE Cannot Practically Achieve Background Levels, Then Perform A Risk Assessment to Develop Alternative Cleanup Criteria**
   Shallow groundwater is already being captured and removed from beneath the former incinerator and laboratory areas by an on-site well and a shallow drain system at the site. Paving the incinerator area will reduce surface water infiltration and will minimize the potential for direct exposure to affected soils. A site-specific risk assessment would allow consideration of these factors in development of alternative cleanup criteria.

Once the incinerator is closed under NR 600, any residual soil contamination of concern that remains would be addressed under RCRA Corrective Action.

We are very interested in the evolving policy for soil contamination cleanup criteria, which the Department is developing (NR 700). We understand that this policy may include alternative cleanup criteria for complex sites that have remediated soils to the lowest concentrations practicable. These alternative cleanup criteria would apparently be developed through a site-specific evaluation of the threat to human health and the environment.

Consistency in the methods used to develop cleanup criteria between the various media (air, groundwater, soil) is slow in developing. Air cleanup criteria are technology-based, whereas groundwater cleanup criteria are risk-based. Soil cleanup criteria appears to be evolving into a hybrid of risk evaluations and local background conditions, with some consideration of what is technically feasible.

Summary

Your experience in interpreting complex issues is required for this particular site. Past disposal practices at the former production laboratory have significantly impacted area soils. This closure could most effectively be addressed by implementing SVE. However, the soil cleanup criteria should be achievable, practicable, and must meet the overall objectives: 1) protection of human health and the environment, and 2) development of a fully integrated remedy under RCRA. Furthermore, CCP desires to fulfill these obligations within our current financial capabilities.

We look forward to resolving the closure goal issues for the incinerator, so that we may move forward with the soil remediation. We understand that the meeting will be held in Madison on March 11, 1992, at 3:00 p.m. We request that Mr. Mulholland and Ms. Fermanich attend this meeting, along with our consultant, RMT, Inc. RMT has been actively involved in the closure process, and was requested to cosign this letter to acknowledge their participation in our upcoming meeting.

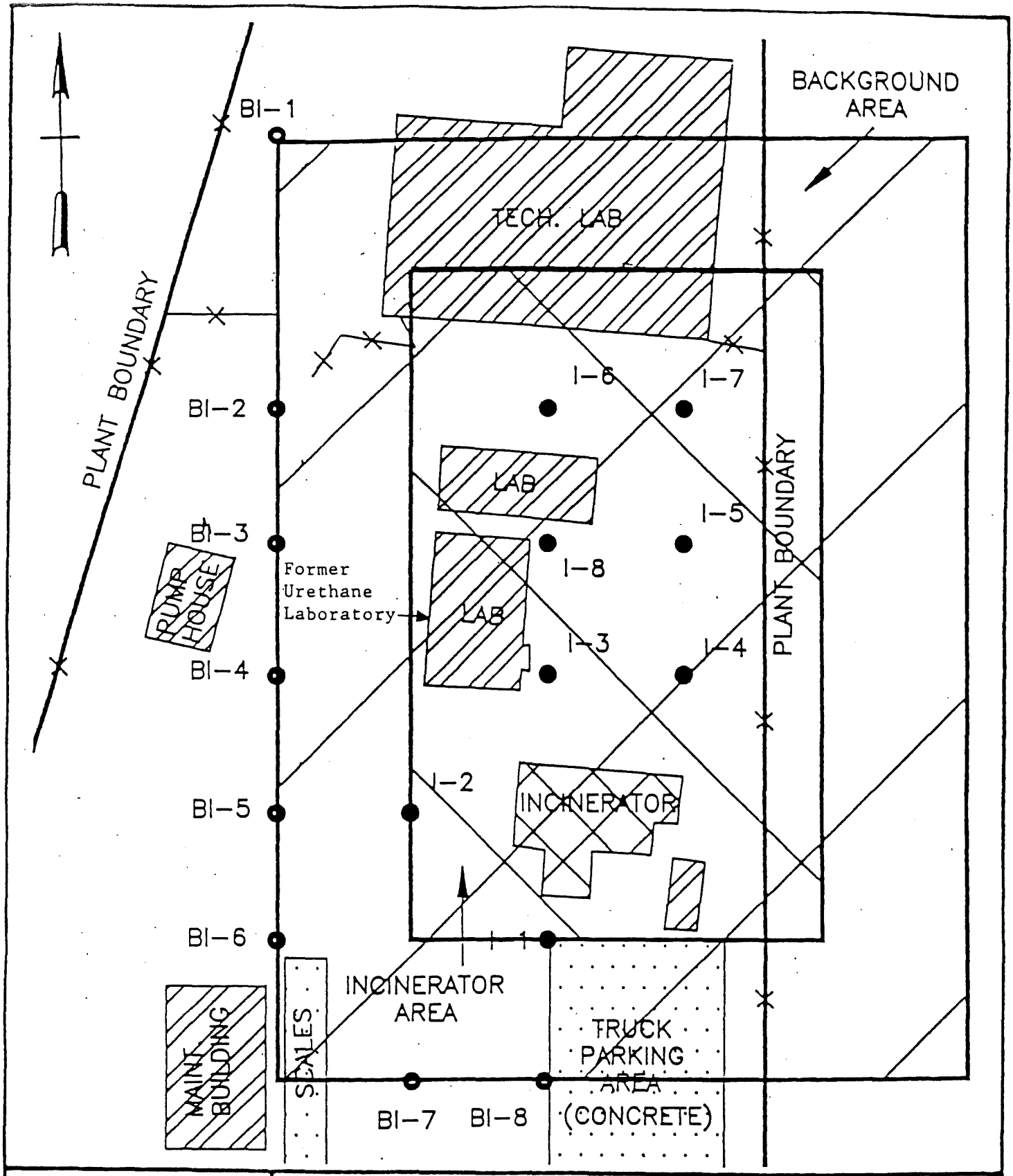
Sincerely,

Russell Cerk
Vice President, Manufacturing

James S. Rickun
Program Manager

nsr

cc: Stacy McAnulty, Tom Stolzenburg/RMT
Jill Fermanich, Ed Lynch, Tim Mulholland, Barb Zellmer/WDNR
Craig Bostwick/CCP



JOB #: 0001-001	~~FIGURE 3~~ SAMPLE LOCATION PLAN CCP SAUKVILLE, WI	HATCHER-SAYRE, INC.
DATE:		
SCALE: 1":40'		
DRAWN BY: RDM		

164734

Figure 1

APPENDIX I

COMPOUNDS INCINERATED AT FORMER INCINERATOR FACILITY

Source: Cook Composites and Chemicals RCRA Part A Submittal, signed 25 July 1983 by Russell Cerk, for Freeman Chemical Corporation.

Listing Number (from ch. NR 605, Wis. Adm. Code)	Chemical Identity
F003	Ignitable, nonhalogenated solvent wastes
D001	Ignitable wastes
U002	Acetone
U007	Acrylamide
U008	Acrylic Acid
U028	bis-Ethylhexylphthalate
U031	n-Butanol
U057	Cyclohexanone
U067	1,2-Dibromoethane
U102	Dimethylphthalate
U112	Ethyl acetate
U121	Trichlorofluoromethane
U140	Isobutanol
U147	Maleic anhydride
U154	Methanol
U159	Butanone
U161	Methyl isobutyl ketone
U166	1,4-Naphthalenedione
U177	N-Nitroso-N-methylurea
U190	Phthalic anhydride
U197	p-Benzoquinone
U220	Toluene
U223	Toluene diisocyanate
U239	Xylene

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: January 28, 1992

FILE REF: 246004330
Ozaukee
HW/LIC

TO: Cook Composites & Polymers' Licensing File

FROM: Tim Mulholland - SW/3

SUBJECT: Closure Decisions and Consequences for CCP

Recent Departmental discussions about Cook Composites' and Polymers' (CCP) closure activities have yielded several interesting questions and issues. It is the purpose of this memo to address some of these questions and issues, so that these issues are apparent to all parties involved.

Situation

CCP is closing a former hazardous waste incinerator. This former incinerator is located in the northern third of the facility and near to production laboratories. The incinerator was appropriately dismantled and decontaminated in late 1989, but residual soil contamination was left. At present this former incinerator is roughly defined as an area of approximately 105' x 60'. This area is contaminated with BTEX (analyses for other compounds have not been performed) as determined in a summer 1991 survey. Outside of the former incinerator area is contaminated soil and ground water. The contamination beyond the incinerator area is assumed to be due to activities associated with the facility in general and not with specific waste handling practices at the former incinerator. The site-wide contamination will be addressed under RCRA Corrective Action, as administered by USEPA-Region V.

Discussions have been held with CCP and their consultant, RMT, to determine the acceptable closure strategy. Due to financial circumstances, CCP does not believe that it can afford a costly remediation plan. In addition, the facility is concerned about the overlap (or lack thereof) of WDNR's closure activities at the former incinerator and the Federal Corrective Action activities throughout the facility. It is difficult for CCP to understand why site-wide and former incinerator contamination cannot be addressed under a single program. As CCP has been told, these are two separate activities occurring under two separate State and Federal authorities. The DNR is trying to coordinate the two activities so that redundant activities are not required.

Hazardous waste facility closure standards require that residual contamination be reduced to non-detectable concentrations for synthetic compounds and to background concentrations for naturally-occurring compounds for a facility to be "closed." (Refer to s. NR 665.10(1), Wis. Adm. Code, for incinerators in particular.) CCP believes that this is a difficult standard to meet, especially when the site-wide contamination is considered. Therefore, the Department will allow CCP to reduce contamination to local background levels (i.e., synthetic chemical contamination may remain in the former incinerator area at background concentrations found beyond the incinerator area). The Department assumes that the former incinerator's residual contamination will then be addressed under Corrective Action.

The Department has also allowed CCP to consider an "alternative" closure strategy for this former incinerator. This closure strategy is called "alternative" because it allows CCP to take longer than the 180 days that is typically expected for a closure period. To pursue alternative closure options, CCP must comply with the following requirements, as listed in an October 18, 1991 NOI for the former incinerator investigation:

- The option must be legitimate;

- The option must be capable of achieving or nearly achieving clean closure;
- The option must be protective of human health and the environment during and after implementation;
- The option must establish effective institutional or other controls over the hazardous waste contamination;
- The option must provide financial assurance in the event that the alternative proves to be ineffective; and,
- The option must comply with the Department's waste management standards.

CCP and RMT have proposed soil-vapor extraction (SVE) to remove BTEX and other volatile compounds. BTEX and other volatile compounds are the most mobile contaminants at this facility and are of the greatest concern to the facility and community. This closure strategy will allow CCP to reduce the most mobile contaminants, and thus reduce a major source of site-wide contamination.

However, since an incomplete investigation has been performed (primarily BTEX analyses have been performed; 1,2-dichlorobenzene, naphthalene, benzoic acid, and phenol have also been detected several feet to the north of the incinerator area) and the DNR does not know what additional contaminants may be present, the DNR remains concerned that the proposed closure strategy may not be sufficient. It is difficult for the agency to pacify CCP's concerns about future closure potentialities since the situation has not been completely characterized. It appears that CCP would like the Department to verify the facility as closed once remediation via SVE is complete. However, since the Department is not certain of all the contaminants that may be present, this assurance cannot be provided based on existing knowledge. There is also the assumption by CCP/RMT that SVE will be effective in this situation, which has not been proven.

One of CCP's and RMT's major concerns is the closure goal. As noted earlier, the usual closure standard is no-detect/background, but in this situation, the Department will use local background for the synthetic contaminants. After the summer 1991 sampling and analyses, the local background beyond the former incinerator area was roughly determined to be 10 mg/kg BTEX. This is the final BTEX concentration in the incinerator area that CCP/RMT have been told they should achieve as the closure goal without further analyses or proposals. RMT believes that this degree of remediation may not be achievable with SVE, and is more comfortable with a closure goal of about 100 mg/kg BTEX.

RMT has proposed a risk assessment to demonstrate that a closure goal higher than that proposed by the Department would not be harmful to human and environmental health, considering that this is an industrial setting with limited exposure paths. RMT has been told that the Department has no mechanism for accepting or reviewing a risk assessment in this situation since the closure performance standard is clearly the removal of all hazardous waste residues to no-detect/background levels. Residual contamination at greater than background concentrations is not acceptable under current regulations and policies, and RMT has been informed of this position.

The point has been clearly made to RMT that CCP's position of using SVE to remove the volatile contamination beneath the former incinerator may not sufficiently address the closure of this site. Since complete investigation for inorganic and semi-volatile organic contamination has not been performed, CCP cannot state with certainty what contaminants are present in the former incinerator area. Since CCP does not know what contaminants are present, it cannot be represented that SVE will be sufficient to remove all contamination. It is known that SVE will likely address the bulk of the volatile contamination that is known to be present.

By pursuing closure activities that use only SVE as the decontamination method, CCP is assuming a degree of risk and should be aware of the Department's concerns with their position. Specifically, if SVE is employed and the closure goal is not met, then further closure activities will be necessary. Similarly, if other

types of contamination are present that are not amenable to SVE, then further closure activities will be necessary that concentrate on those remaining contaminants.

In CCP's favor is the evolution of hazardous waste regulation and the corrective action process at this facility. Unfortunately, this evolution is slow. On the issue of changes to hazardous waste facility closure requirements, recent policy memoranda from the USEPA have noted that risk assessments may be acceptable under certain Federal remedial/closure circumstances. While the Wisconsin Department of Natural Resources has not thoroughly reviewed this position or adopted it, it is likely that this issue will be considered in the future.

Even though this regulatory evolution occurs, with an unpredictable rate and direction, CCP should address all contamination at the former incinerator area at this time. The Department expects closure activities to consider all contamination, and investigations necessary to determine extent and degree of all contamination, without putting closure activities off until some future time, with hopes based on future regulatory or financial conditions. If this was the case, then the Department would be in the position of managing numerous on-going closure activities while facilities waited until an indeterminate future time for changes in hazardous waste regulations or owner finances that would make hazardous waste facility closure more palatable.

This memo has been prepared to consider the possible implications of CCP's potential positions so that the Department, CCP and RMT are all aware of some of the conceivable consequences of these positions.

cc: J. Fermanich/E. Lynch - SW/3
C. Bostwick - CCP
J. Rickun/S. McAnulty/T. Stolzenburg - RMT

TSM8\CCP\ISSCLOSE.CCP

WISCONSIN
DEPT. OF NATURAL RESOURCES

Carroll D. Besadny
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Street
Box 7921
Madison, Wisconsin 53707
DNR TELEFAX 608-267-3579
DNR TDD 608-267-6897
SOLID & HAZARDOUS WASTE MGMT 608-266-2111
SOLID & HAZARDOUS WASTE FAX 608-267-2768

March 4, 1992

File Ref: 246004330
Ozaukee
HW/LIC

Mr. Russell L. Cerk
Vice President, Manufacturing
Cook Composites and Polymers
Port Washington, WI 53074-0996

SUBJECT: Meeting Request

Dear Mr. Cerk:

Your request for a meeting was received on March 2, 1992. As requested, my staff and I will be available to meet with you on March 11, 1992, at 3:00 pm. This meeting will be held in room 317 of the GEF II building, at 101 S. Webster Street in Madison. Attending from the DNR will be myself, Barb Zellmer, Chief of the Hazardous Waste Management Section, Ed Lynch, Facilities Standards and Closure Unit Leader, Jill Fermanich and Tim Mulholland.

So that we all have a common basis for this meeting, if you prepare an agenda, we would appreciate receiving it as soon as possible. I'm sure that it will reflect the issues raised in February 27th letter, but you may want to set some time frames for the discussion of these issues.

If you have any questions, I would direct your calls to Tim Mulholland at (608) 266-0061. I can be reached at (608) 266-1327 if necessary.

Sincerely,

Paul P. Didier

Paul P. Didier, P.E., Director
Bureau of Solid & Hazardous Waste Management

PPD:tsm

cc: C. Bostwick - Cook Composites and Polymers.
J. Rickun/S. McAnulty/T. Stolzenburg - RMT
B. Zellmer/E. Lynch/J. Fermanich/T. Mulholland - SW/3

APPENDIX B

CLOSURE BY REMOVAL OF RESIDUAL SOIL CONTAMINATION

WISCONSIN
DEPT. OF NATURAL RESOURCES

Carroll D. Besadny
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Stree
Box 7921
Madison, Wisconsin 5370
DNR TELEFAX 608-267-357
DNR TDD 608-267-689
SOLID & HAZARDOUS WASTE MGMT 608-266-211
SOLID & HAZARDOUS WASTE FAX 608-267-276

Received April 6, 1992
S. McAnulty

March 20, 1992

File Ref: 246004330
Ozaukee
HW/LIC

Mr. Russell Cerk
Vice President, Manufacturing
Cook Composites and Polymers
217 Freeman Drive
Port Washington, WI 53074

SUBJECT: Closure of Former Hazardous Waste Storage and Incinerator Area;
Cook Composites and Polymers, Saukville, WI 53080
EPA I.D.: WID980615439

Dear Mr. Cerk:

We would like to thank both you and the others representing Cook Composites and Polymers (CCP) for providing us the opportunity to meet on March 11. We believe that the discussions were fruitful in obtaining an understanding of what is necessary for the satisfactory closure of the former hazardous waste storage and incinerator area.

The purpose of this letter is to clarify the Department's requirements for the closure of these hazardous waste units. This letter will present the main points that were discussed and resolved during our recent meeting for the closure plan modification for these units.

A modification of your closure plan is required for the former hazardous waste storage tanks and incinerator area that meets the requirements of ss. NR 645.17 and 665.10, Wis. Adm. Code. In developing the closure plan modifications the following factors need to be addressed:

- Background BTEX contamination has been determined by the DNR from information provided by CCP to be 530 mg/kg. CCP may propose additional soil sampling if this sampling is linked to a specific closure plan that justifies it. No background concentrations for any other compounds (i.e., semi-volatile organic chemicals) have been established and this will be necessary if in-situ closure methods are proposed.

- At the December 20, 1991 meeting between CCP, RMT, and the DNR, the Department verbally agreed to an attainment area of 105' east-west by 60' north-south that immediately surrounds the former hazardous waste incinerator and storage tanks. If this attainment area is proposed to be reduced further, the Department will require written justification in the closure modification

- The Department's objective is to receive from CCP a closure plan modification that addresses the residual soil contamination not addressed by previous closure activities, by April 3, 1992. In addition to presenting the alternative longer-term closure option of using soil-vapor extraction as an in-situ method, which was discussed during the meeting, this closure plan modification shall propose a closure methodology that will yield closure within 180 days as required by ss. NR 665.10 and 685.05, Wis. Adm. Code, and specifically s. NR 685.05(2)(d), Wis. Adm. Code.

  The Department must receive a closure methodology that can be implemented to the closure goals within 180 days for purposes of comparing this required methodology to any proposed alternative closure methodologies that may require longer than 180 days. This modification will update the closure options developed in the September 1991 "Evaluation of Remedial Options" report prepared by Hatcher-Sayre for this area, based on the latest boundaries of residual contamination and area/volume. Other methods for achieving closure may also be included in the modification. There must be sufficient supporting information in the closure plan to justify the closure methodology chosen for this site. This closure plan modification must be submitted according to the requirements of ss. NR 680.05, 680.07(4), and 680.45 (Table XII), Wis. Adm. Code, and should be sent to the DNR's Southeast District office in Milwaukee and to the Bureau of Solid & Hazardous Waste Management, Hazardous Waste Management Section in Madison.

  As previously noted, the in-situ closure goal is 530 mg/kg BTEX (other contaminant reduction goals are unresolved). If in-situ closure methodologies are pursued, it is assumed by the Department that additional remediation requirements will be addressed under the Corrective Action program authorities to further reduce contamination in the former hazardous waste storage tank and incinerator area, as part of the efforts to address site-wide contamination at the facility. Any excavation of contaminated soil performed as a part of closure activities may require that contaminated soil be handled as a hazardous waste.

- CCP should also be aware that ch. NR 103, Water Quality Standards for Wetlands, Wis. Adm. Code, was finalized in August, 1991. Project proponents who submit documents to the Department for review under ch. 144, Wis. Stats., which includes decisions made under the hazardous waste statutes, are required to comply with ch. NR 103, Wis. Adm. Code, and demonstrate in submittals to the Department that compliance with ch. NR 103, Wis. Adm. Code, has been achieved. CCP and/or its consultants are encouraged to contact the Department for assistance if it is required. In addition, any closure methodologies that may involve emissions to the air may require approvals by the Department's Air Management program. CCP is responsible for obtaining those approvals.

- CCP must submit a financial assurance mechanism to cover the costs of the approved closure method, per s. NR 685.07, Wis. Adm. Code. For alternative closure methodologies, financial assurance need only be prepared to cover the operation and maintenance costs for the approved alternative closure

methodology. Financial assurance must be submitted before operation of any closure methodology(s) may proceed.

If you have any questions concerning this letter, please call Tim Mulholland at (608) 266-0061. I may be reached at (608) 266-7055.

Sincerely,

Barbara J. Zellmer, Chief
Hazardous Waste Management Section
Bureau of Solid & Hazardous Waste Management

cc: P. Didier - SW/3
E. Lynch/J. Fermanich/T. Mulholland - SW/3
W. Ebersohl/P. Brady - SED
C. Bostwick - CCP
J. Rickun/S. McAnulty/T. Stolzenburg - RMT

TSM10\CCP\CLOSRSP.LET

APPENDIX B

CLOSURE BY REMOVAL OF RESIDUAL SOIL CONTAMINATION

Removal and disposal of contaminated soils within the incinerator area could provide clean closure of this area within 180 days. Figure B-1 illustrates the potential excavation limits, sideslopes, and foundation areas that would require protection. Assuming an 11-foot depth of excavation, approximately 3,200 cubic yards of soil would be removed. Several issues concerning the feasibility of soil removal in this area are discussed below.

Soil Incinerator

The existing solids incinerator was located adjacent to the former hazardous waste liquids incinerator. The soil beneath the solids incinerator is located within the former hazardous waste incinerator area. Therefore, clean closure of the area could not be achieved in 180 days without removal of this soil.

The incinerator is used to burn solid nonhazardous waste at the facility, and does not require an air discharge permit for operation. The incinerator includes an approximate 20-foot-high tower that is secured by tension wires to a concrete foundation pad. The solids incinerator could not be relocated without serious risk of damage to the incinerator. As a result, the existing incinerator would be removed and disposed, and a new solids incinerator would be constructed on-site.

Building 7 - Former Urethane Laboratory

The integrity of building 7 must be maintained during excavation activities. Sheetpiling could be installed to minimize soil movement outward from beneath the building foundation and into the open excavation. Alternatively, underpinning (injection of cement grout beneath the foundation) may reduce disturbance of the foundation.

TABLE 1

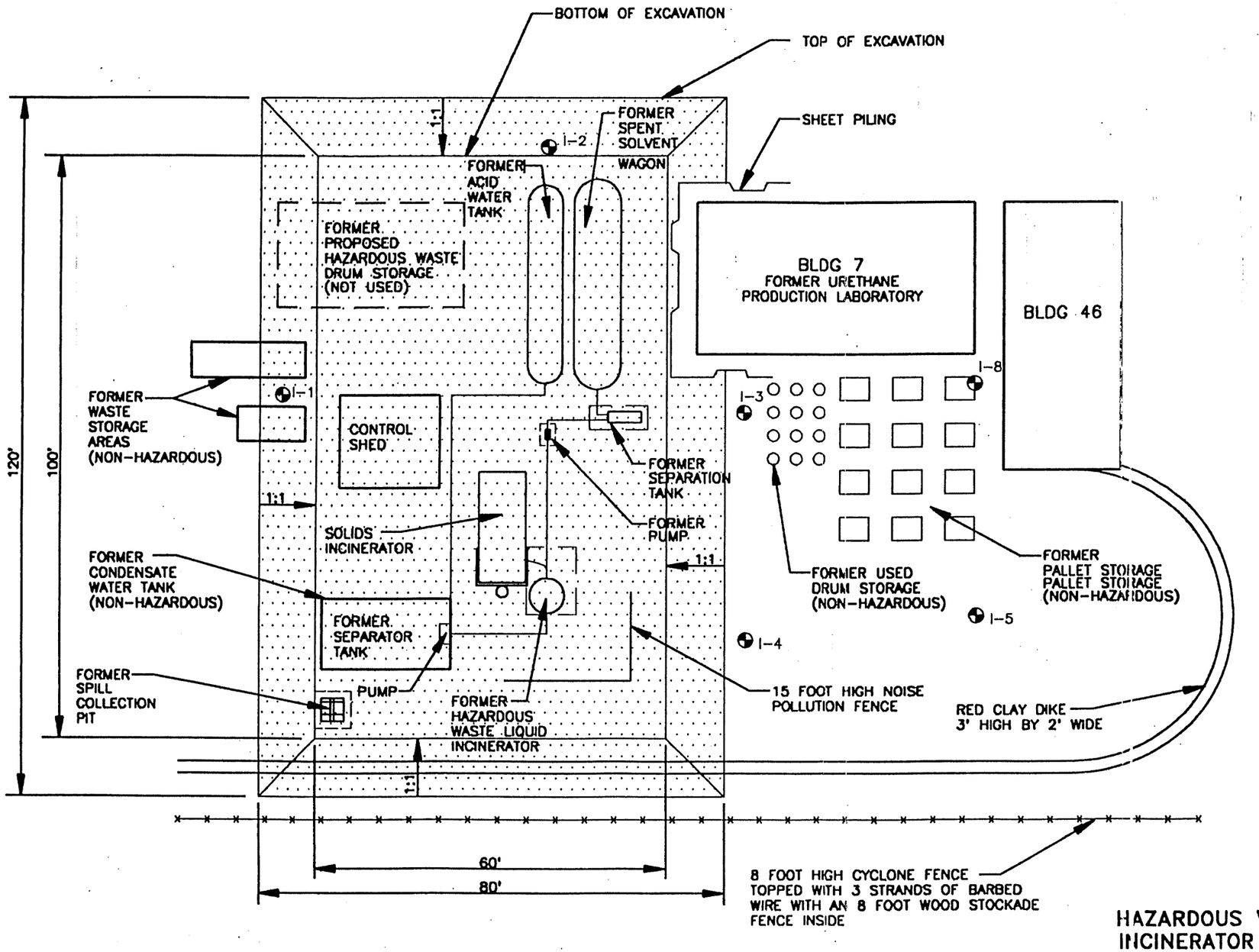
TOTAL BTEX BACKGROUND LEVELS FROM BORINGS
SURROUNDING THE INCINERATOR (mg/kg)

Sample Depth	I-3*	I-4*	I-5*	I-7*	BI-7**	BI-8**
1.5 - 3.0'	974	459	310	0.6	0.01	0.2
4.5 - 6.0'	16,300	760	940	7,330	0.01	104
7.5 - 9.0'	399	105	71	110	27	28
9.5 - 11.0'	396	95	51	762	50	49
AVERAGE (over depth)	4,517	354	343	2,051	19	45

AVERAGE BACKGROUND = 1,222 mg/kg (STD.DEV - 3,534 mg/kg) surrounding the incinerator (24 samples).

* These locations are clearly separate from the incinerator operations and are affected by laboratory practices in the area.

** These locations are clearly separate from the incinerator operations and may be affected by past facility disposal practices.



LEGEND

- POTENTIAL SPILL AREA
- I-5 APPROXIMATE SOIL BORING LOCATION
- FENCE
- PROPOSED EXCAVATION AREA

0 20 40

SCALE: 1" = 20'

SOURCE: FREEMAN CHEMICAL RCRA PART B APPLICATION.
RECEIVED AT USEPA REGION V 2/17/83
RECEIVED AT WDNR 3/3/83 (COPY 7)
MODIFIED PER CRAIG BOSTWICK/CCP 12/91

HAZARDOUS WASTE INCINERATOR AREA
FEBRUARY 9, 1983

COOK COMPOSITES & POLYMERS

RMT INC.

DWN. BY:	TBM
DATE:	APRIL 1992
PROJ.#	1832.21
FILE #	18322101

APR 1 4 1992 FIGURE B-1

Feasibility of Installing SheetPiling

The feasibility of installing sheetpiling is affected by the site's shallow depth to bedrock, which is approximately 15 to 20 feet below the surface (Hatcher-Sayre, 1986). Assuming an 11-foot-deep excavation, the required depth of embedment for the sheetpiling would be roughly 20 feet below the bottom of excavation, or about 30 feet below the ground surface. Tie-back anchors would be required to stabilize the sheetpiling because of the shallow depth to bedrock. A geotechnical engineering analysis is required to determine if sheetpiling is feasible even with the tie-back anchors.

Underground Utilities

A number of active underground utilities exist within the limits of excavation. These utilities would have to be located, disconnected, and then reinstalled elsewhere at the site prior to excavation of the area.

Health and Safety Considerations

The average level of BTEX detected in soil at the incinerator area was 1,252 mg/kg. PID/FID (OVA) readings from split-spoon soil samples collected within the incinerator area ranged from 1 to 580 ppm (benzene equivalents). Based on this information and the origin of the contaminants (resin manufacturing), it is anticipated that the excavation activities would be conducted in Level B or C personal protective gear.

Volatile organic compounds (VOCs) would be released to the atmosphere in an uncontrolled environment during excavation activities. Building 46 is located approximately 40 feet north of the proposed excavation. The on-going production manufacturing process at building 46 may be interrupted during excavation activities if VOCs in the ambient air affected plant personnel.

Excavation equipment would be decontaminated using a high-pressure spray wash. The decontamination residuals would be collected and disposed according to state and federal regulations. Once the soil was removed, the soil would constitute a hazardous waste because the contamination results from spills of reaction water (D001) and waste xylene (F003). The soils would be disposed of at a hazardous waste incineration and disposal facility. A geomembrane liner would be placed in the excavation prior to backfilling to minimize intrusion

of contaminants from surrounding soils. Clean fill would then be placed and compacted at the excavation.

The typical cost for this option is presented in Table B-1. Approximately 11.9 million dollars is estimated for soil removal and disposal assuming a unit disposal cost of $1,400.00 per ton, and assuming the solids incinerator is removed.

Closure of the site under this option would be based on the area defined by historical records of the incinerator operation and hazardous waste storage areas. If soils were left in-place below the solids incinerator, an alternative method of *in-situ* soil treatment would be required for final closure of the site.

TABLE B-1

TYPICAL COST FOR SOIL REMOVAL AND DISPOSAL

1.	Mobilization/Demobilization	$ 6,000
2.	Removal of existing solids incinerator and construction of new solids incinerator[1]	2,500,000
3.	Sheetpiling installation[2]	38,000
4.	Relocation of utilities	40,000
5.	Excavation[3]	48,000
6.	Soil analyses[4]	18,000
7.	Transportation & disposal of soil[5]	7,420,000
8.	Disposal of solid waste during solids incinerator downtime[6]	12,000
9.	Solid waste analyses[7]	9,000
10.	Loss in production for molding process at Building 46[8]	28,000
11.	Backfill, compaction, and finishing[9]	54,000
12.	Decontamination of equipment and personal protective clothing and equipment[10]	30,000
13.	Disposal of decontamination residuals[11]	10,000
	Subtotal	$10,213,000
	15% Contingency	1,532,000
	Subtotal	$11,745,000
	Engineering & Construction Management	200,000
	Total	**$11,945,000**

TABLE B-1 (CONTINUED)

**TYPICAL COST
FOR SOIL REMOVAL AND DISPOSAL**

ASSUMPTIONS:

1. Removal of soil beneath the solids incinerator is required for clean closure of the site in 180 days. Lump sum estimate for new solids incinerator per CCP.

2. Installation of sheetpiling is feasible with tie-backs; 750 square feet of piling at $10.00 per square foot and 10 anchors at $3,000.00 per anchor.

3. Excavation of 3,200 c.y. of contaminated soil at $15.00 per c.y.

4. One set of analyses per 400 c.y. of soil removed to characterize soil for disposal, eight samples at $2,200.00 per sample.

5. Disposal by incineration of 5,300 tons of hazardous soil at $1,400.00 per ton (unit cost per Hatcher-Sayre, 1991, Evaluation of Remedial Options). RMT's experience indicates that current incineration costs are typically $2,000.00 per ton.

6. Incinerator downtime of 4 weeks; 800 c.y. of solid waste at $15.00 per c.y., per CCP.

7. One set of analyses per 200 c.y. of solid waste to characterize waste for disposal, four samples at $2,200.00 per sample.

8. Assume 2 days of production downtime resulting from release of volatiles during excavation; 2 days at $14,000 per day, per CCP.

9. Backfill, compaction, and finishing of 3,200 c.y. excavation at $17.00 per c.y.; unit cost includes placement of geomembrane liner prior to backfilling.

10. Includes decontamination of equipment disposal of personal protective clothing and gear, and supplies for Level B or C field activities.

11. Disposal of ten 55-gallon barrels of hazardous waste residuals at $1,000.00 per barrel.

APPENDIX C

SOIL SAMPLING METHODS

APPENDIX C
SOIL SAMPLING METHODS

Soil borings will be drilled using hollow-stemmed augers. Logs of each borehole will be prepared. Soil samples will be collected at 1.5-foot intervals using a split-spoon sampling device. The soils will be visually classified according to Unified Soil Classification System, placed in labeled sample containers, and iced. Samples will be transported to RMT Laboratories in Madison, Wisconsin, with Chain-of-Custody documentation.

The split-spoon samplers will be decontaminated prior to use on-site and between samples. Cleaning procedures include the following:

- Scrubbing away soil with a stiff brush in trisodium phosphate soap solution.
- Double-rinsing in clean potable water.

To minimize potential contamination between boreholes, drilling equipment will be decontaminated using a high-pressure spray wash. Decontamination residuals and drill cuttings will be drummed and stored on-site until disposal at a later date. Test sample results will determine the method of disposal for the wastes.

APPENDIX B

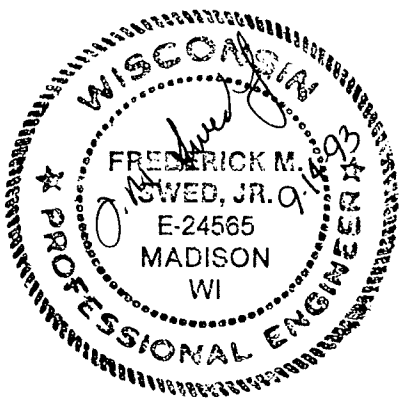
RESULTS OF SOIL VAPOR EXTRACTION PILOT-SCALE TEST (SEPTEMBER 1993)

RESULTS OF
SOIL VAPOR EXTRACTION
PILOT-SCALE TEST

PREPARED FOR
COOK COMPOSITES AND POLYMERS
SAUKVILLE, WISCONSIN

PREPARED BY
RMT, INC.
MADISON, WISCONSIN

SEPTEMBER 1993



Peter J. Glassen
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RR
8359

INC.

RMT, INC. – MADISON
744 HEARTLAND TRAIL MADISON, WI 53717-1934
P.O. BOX 8923 MADISON, WI 53708-8923
608/831-4444 608/831-3334 FAX

1832.42 0000:RTB:cook0819

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EXECUTIVE SUMMARY

In pursuing final closure of a former hazardous waste incinerator at its Saukville, Wisconsin, facility, Cook Composites and Polymers (CCP) retained RMT, Inc. (RMT), to conduct two soil vapor extraction (SVE) tests on June 15, 1993. The results of the tests indicate that SVE is an effective technique for removing volatile organic contaminants from unsaturated soil at the former hazardous waste incinerator area.

Benzene, toluene, ethylbenzene, and xylenes (BTEX) were removed from the soils of the former hazardous waste incinerator area, in the 10^{-4} to 10^{-5} lb/ft^3 range, which is moderately high compared to other sites.

The water table was encountered 5 to 6 feet below grade, which is 2 to 5 feet higher than normal. The unusually high water table limited the rate of airflow through the soil, and a radius of influence could not be determined for design of the well spacing. The low air flow rate achieved with the high water table would limit the total mass removed over time.

RMT recommends monitoring the groundwater levels on a monthly basis until the levels decrease to previous levels. The radius of influence could then increase levels of vacuum, which would form the basis for the final design.

Section 1
INTRODUCTION

1.1 Background

CCP is pursuing final closure of a former hazardous waste incinerator at the Saukville, Wisconsin, facility (Figure 1). RMT was retained by CCP to conduct pilot-scale tests to determine the efficiency of SVE to address residual soil contamination at the site.

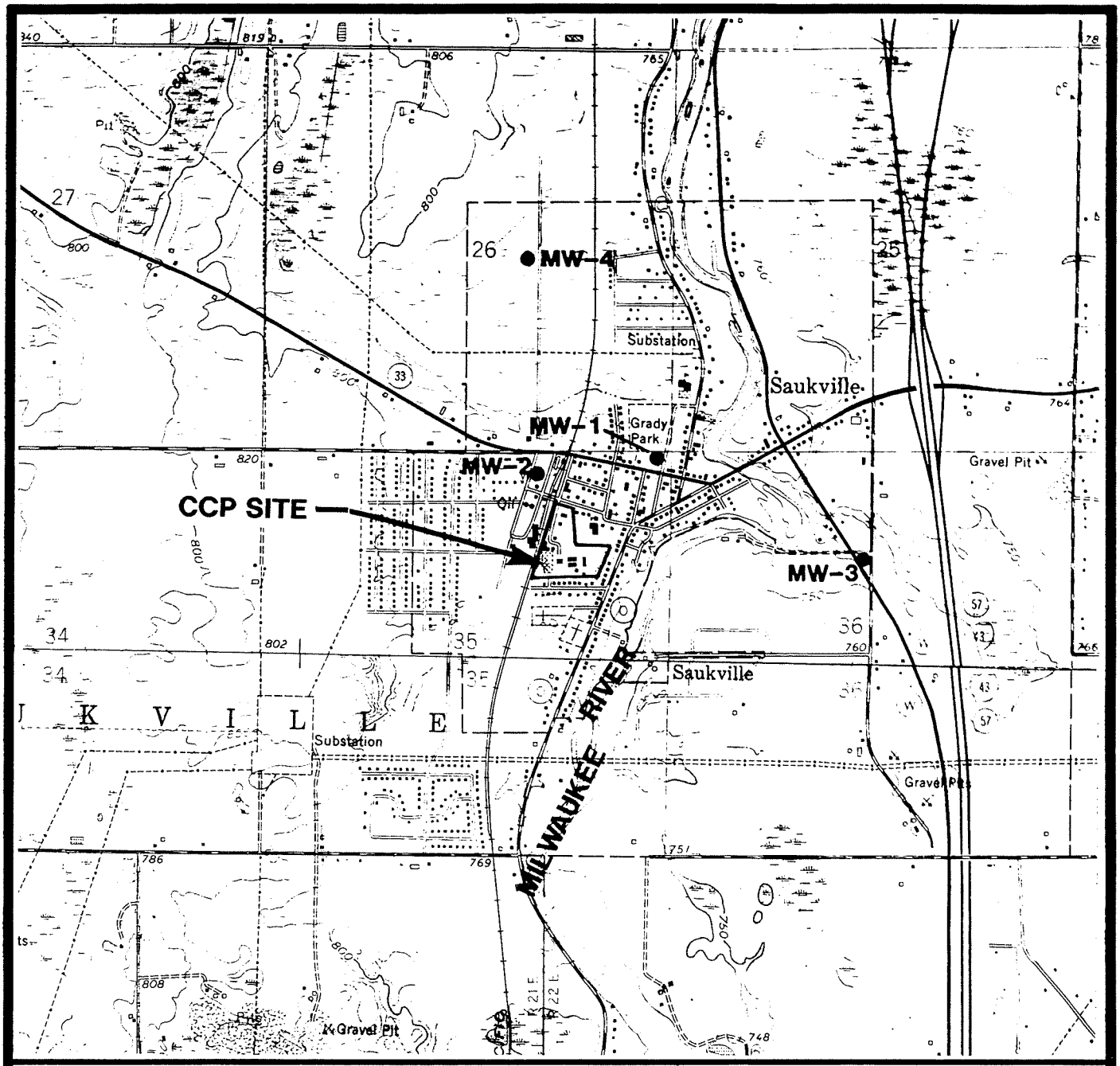
This report was prepared to satisfy Condition #4 of the September 14, 1992, closure plan modification conditional approval issued by the Wisconsin Department of Natural Resources (WDNR).

1.2 Purpose and Scope

The purposes of this work were to complete pilot-scale tests on two new soil vapor extraction (SVE) wells, to monitor influence with two new soil vapor monitoring wells, and to procure information on the effectiveness of treating the impacted soils in the incinerator area with SVE. This information would be used for designing a full-scale SVE system in the former hazardous waste incineration area if the technology was shown to be effective.

The scope of the work included the following activities:

- Installed four SVE/vacuum monitoring (VM) wells within the affected area, to a depth of 10 feet
- Collected and laboratory-analyzed seven soil samples from the SVE borings
- Collected and performed moisture content, Atterberg limit, and grain-size distribution on seven soil samples from the SVE borings
- Using a vacuum blower, induced a vacuum on the SVE wells and measured the subsequent flow rate and the induced vacuum on the VM wells, which are screened above the water table
- Extracted subsurface air samples for on-site analysis by a Photovac 10S50 portable gas chromatograph (GC)
- Recorded wellhead vacuum and flow rates throughout the test
- Examined the effectiveness of SVE technology to remove residual volatile organic compounds (VOCs) from the soil



STATE LOCATION

0 2000 4000

SCALE: 1"=2000'

N

SITE LOCATION MAP
COOK COMPOSITES AND POLYMERS

SOURCE: BASE MAP FROM PORT WASHINGTON WEST AND CEDARBURG WISCONSIN 7.5 MINUTE USGS QUADRANGLES.

RMT INC.

DWN. BY:	DJW
DATE:	JANUARY 1993
PROJ.#	1832.33
FILE #	18323301

FIGURE 1

Section 2

RECOMMENDATIONS

Based on the limited results gained from the SVE pilot tests, it appears that VOCs can be extracted at comparatively high concentrations under reasonable source vacuum conditions. RMT recommends that CCP monitor groundwater elevations for the next 6 months on a weekly basis to determine when the high groundwater levels recede to historical levels. RMT recommends performing an additional pilot test at that time to substantiate data for a final remedial design.

If the groundwater does not recede to historical levels after 6 months, CCP will contact the WDNR to discuss the next course of action.

Section 3
DISCUSSION

3.1 Well Installation

Two SVE wells and two VM wells were installed June 14, 1993, by Environmental & Foundation Drilling, Inc. (EF&D). The two SVE wells were installed in the former hazardous waste incinerator area, and the two VM wells were located strategically for monitoring vacuum level from both SVE wells. Figure 2 contains well locations, and Appendix A contains well construction logs and soil boring logs.

RMT had planned to install the two SVE wells in the unsaturated zone of the soils, where historical groundwater levels were 8 to 10 feet below grade (RMT, 1993). During drilling of the SVE and VM wells, the groundwater was encountered between 5 and 6 feet below grade. With the above-normal rainfall this year, the water table appears to have risen 2 to 5 feet. During installation of the two SVE wells, RMT collected seven soil samples for laboratory analysis of VOCs 8020, moisture content, Atterberg limit, and grain-size distribution. See Appendix B for laboratory results and Appendix C for soil characteristics.

3.2 Field Procedures

Two SVE pilot tests were conducted on June 15, 1993. Each wellhead (VE-1 and VE-2) was equipped with instrumentation to monitor airflow rate, vacuum, and temperature during testing. Each well was also equipped with a sample port for collection of air samples during the test. A small explosion-proof regenerative blower was connected to each well and was used to extract air from the subsurface of the incinerator area.

One measure of the performance of the SVE system is to measure vacuum in the soils at a distance from the vapor extraction wells. It is possible to measure vacuum in soils at a distance from the air extraction well by taking vacuum readings in surrounding wells. The measured vacuums at a distance can be used to determine whether soil vapor is being induced to flow toward the vapor extraction well. The maximum distance (from the vapor extraction well) from which soil vapor is induced toward the well is called the "radius of influence." The radius of influence is dependant on the vacuum developed in the vapor extraction well so that, typically, the higher the vacuum, the greater the radius of influence.

Soil off-gas samples were collected from each vapor extraction well during each pilot test. Gas was collected in a 200-mL glass sampling bottle using a vacuum hand pump. The bottle was then sampled using a gas-tight syringe, which was injected into a portable GC for analysis. The GC was calibrated for the compounds of interest (BTEX).

The GC was operated following procedures set forth in the Photovac, Inc., instruction manual. Gas standards were prepared by appropriately diluting the headspace over the pure solvent. Quality assurance and control measures for gas analysis are included in Appendix D.

3.3 Results

Two separate pilot tests were conducted over a 3-hour period, each producing similar results. The first pilot test (VE-1) was located at the west end of the incinerator area and was started at 9:30 a.m. For this test, a higher vacuum (approximately 40 inches water column) was applied and it induced a flow rate of approximately 45 scfm. After 2 hours, the vacuum level had to be reduced due to the increase in water level in the well, which caused water to be drawn through the vacuum blower. A reduction to 21 inches of water column reduced the flow rate to approximately 40 scfm, but did not reduce the water level in the well. A limited vacuum was observed at VM-1 during this test, approximately 25 feet away. Six off-gas samples, which were collected routinely throughout the test, contained measurable concentrations of BTEX.

The second pilot test (VE-2), located at the east end of the incinerator area, was started at 1 p.m. For this test, a lower vacuum (approximately 22 inches water column) was applied, which induced a flow rate of approximately 33 scfm, to try to reduce the effect on the water table level. However, even at the low vacuum rate, the water level in the vapor extraction well increased. After 1.5 hours of operation and with groundwater levels already increasing, the vacuum was increased to 35 inches of water column at an approximate flow rate of 44 scfm so that the effect of increased vacuum levels on off-gas concentrations could be observed. During the test, no vacuum was observed at the VM wells or at VE-1. Six off-gas samples, which were collected throughout the test, contained measurable concentrations of BTEX.

For a summary of both pilot tests and operational logs, see Appendix E. For the analytical results, see Appendix F.

3.4 Interpretation of Test Results

The test results indicate that BTEX compounds are extractable through soil vacuum extraction in the incinerator area of the CCP Plant. Off-gas concentration ranged from 10^{-4} to 10^{-5} pounds (total BTEX)/cf of air, which are moderately high compared to other sites.

Both pilot tests indicated limited or no radius of influence of the vacuum from the vapor extraction wells. RMT believes that this is due to the atypically high groundwater levels. It is believed that, due to the excessive rainfalls this year in the Saukville area, the groundwater level has gone from 8 to 10 feet below grade to 5 to 6 feet below grade. Because of the high water level, a reduced vacuum had to be used, thus limiting the radius of influence. A review of the water levels in the VE wells indicated that the water table elevation was probably partially obstructing the screened interval of the wells during the pilot test.

The consequence of the high water table is that SVE technology will be only marginally effective. The site geology and the off-gas BTEX concentrations suggest that the technology will be capable of removing VOCs, but inducing sufficient air flow will not be possible as long as high groundwater persists. Thus, the following options appear to be available:

- ***Put the design and construction of a "full-scale" system "on hold" until water levels subside.*** At that time it would be possible to repeat the test, confirm the radial influence, design additional wells if necessary, specify equipment, and construct a final system with a higher level of assurance of success.

- ***Make a "best guess" at future performance, install a system now, and forego startup and operation until water levels subside.*** This is a somewhat riskier option since, although there are positive indications of likely success, there are uncertainties over radial influence and the extent to which (and the amount of time until) water levels will return to historic levels.

- ***"Dewater" the area to improve system efficiency.*** This would require the installation of a shallow well point or trench system to lower the water table by up to several feet across a broad area. This would be potentially feasible but would incur significant additional costs.

RMT believes that Option 1 is preferable at this time, assuming that regulatory acceptance can be obtained. Since the in-place soils do not pose an imminent threat, the added risks and costs incurred by Options 2 and 3, respectively, do not appear necessary.

In addition, the groundwater beneath the former incinerator area is within the capture zone of a downgradient recovery well (MW-47). Thus, any BTEX enrichment of the groundwater due to the elevated water table would still be effectively controlled.

If after 6 months of groundwater monitoring the water table has not lowered, the WDNR will be contacted by CCP to discuss the next course of action.

3.5 Air Emissions

Assuming that a full-scale SVE system is eventually built and operated, the system must operate within the following limits:

- Total VOC emissions are to be under 15 lbs/day and 3.1 lbs/hr (24 hr/day operation) (NR 424). If emissions exceed these levels, CCP would be required to control emissions by 85 percent or demonstrate that control is technologically infeasible.
- The following emissions are not to be exceeded for release points less than 25 feet in height (NR 445):
  - Toluene - 31.2 pounds per hour averaged over 24 hours
  - Ethylbenzene - 36.2 pounds per hour averaged over 24 hours
  - Xylenes - 36.2 pounds per hour averaged over 24 hours
  - Benzene - 300 pounds per year

If the system meets these criteria, no permit or air pollution control will be required for the remediation.

The level of benzene in system emissions would need to be monitored to ensure that the system does not exceed the limit of 300 pounds per year. A full-scale system should be monitored daily for the first 3 days of operation, weekly for the next 3 weeks, and monthly thereafter to provide data to calculate cumulative emissions of benzene from the system during operation. However, the cumulative emissions from the system may not exceed 300 pounds of benzene per year without obtaining an air pollution control permit and conducting a Best Available Control Technology (BACT) analysis.

The emissions resulting from the pilot tests were at low enough levels that an air emission permit was not required for the test. The maximum potential emission rate without a permit is 5.7 pounds per hour (NR 406.04). However, during initial operation, a reduced flow rate may be required at VE-1 in order to stay within the 15-pound-per-day/3.1-pound-per-hour limit. During the pilot test, a total of 15 pounds of organics were discharged over the approximate 5 hours of testing. The results of each pilot test summarizing cumulative emissions are presented in Appendix E.

Section 4

REFERENCES

RMT, Inc. 1992. Closure Plan Modifications, Cook Composites and Polymers. April 1992.

RMT, Inc. 1993. Semivolatiles Investigation Report for Closure of the Former Hazardous Waste Incinerators and Storage Area at Cook Composites and Polymers. January 1993.

APPENDIX A

WELL CONSTRUCTION AND BORING LOGS

Environmental & Foundation Drilling, Inc.
217 Raemisch Road Waunakee, WI 53597
(608) 849-9896

SOIL BORING LOG

BORING # VM-1

Date started 6 / 14 / 93
Date completed 11 / 11 / 11
Page ____ of ____

PROJECT: Cook Composites
JOB # 1448A

LOCATION: 12' FROM OFFICE
ELEVATION ____

DEPTH 0'-0"	SOIL CLASSIFICATION & NOTES	SAMPLE NUMBER	DEPTH	BLOW COUNTS	MOISTURE REC		Q P
	ASPHALT	1	1.0/3.0	2 2 1 2	19	M	
0.7			1.0/2.5				
	BL-BR- CLAY SAND, SOME SILT	2	3.5/5.5	2 3 4 15	14	M	
	AND GRAVEL		3.5/5.0				
6.0		3	6.0/8.0	17 9 19 17	9	S	
	BR- FINE SAND, SOME SILT		6.0/7.5				
	SOME GRAVEL, TRACE CLAY						
			8.5/10				
9.0	E.O.B.		13.5/15				
			18.5/20				
	INSTALLED WELL						

WATER LEVEL MEASUREMENTS
5.2 +- At comp.

DRILLING METHOD 4.25 HSA
SPECIAL NOTES ON BACK

PLG/LLM/DRO

Environmental &
Foundation
Drilling, Inc.
217 Raemisch Road Waunakee, WI 53597
(608) 849-9896

MONITORING WELL LOG

PROJECT Cook Composites

LOCATION 12' FROM OFFICE

JOB # 1448A

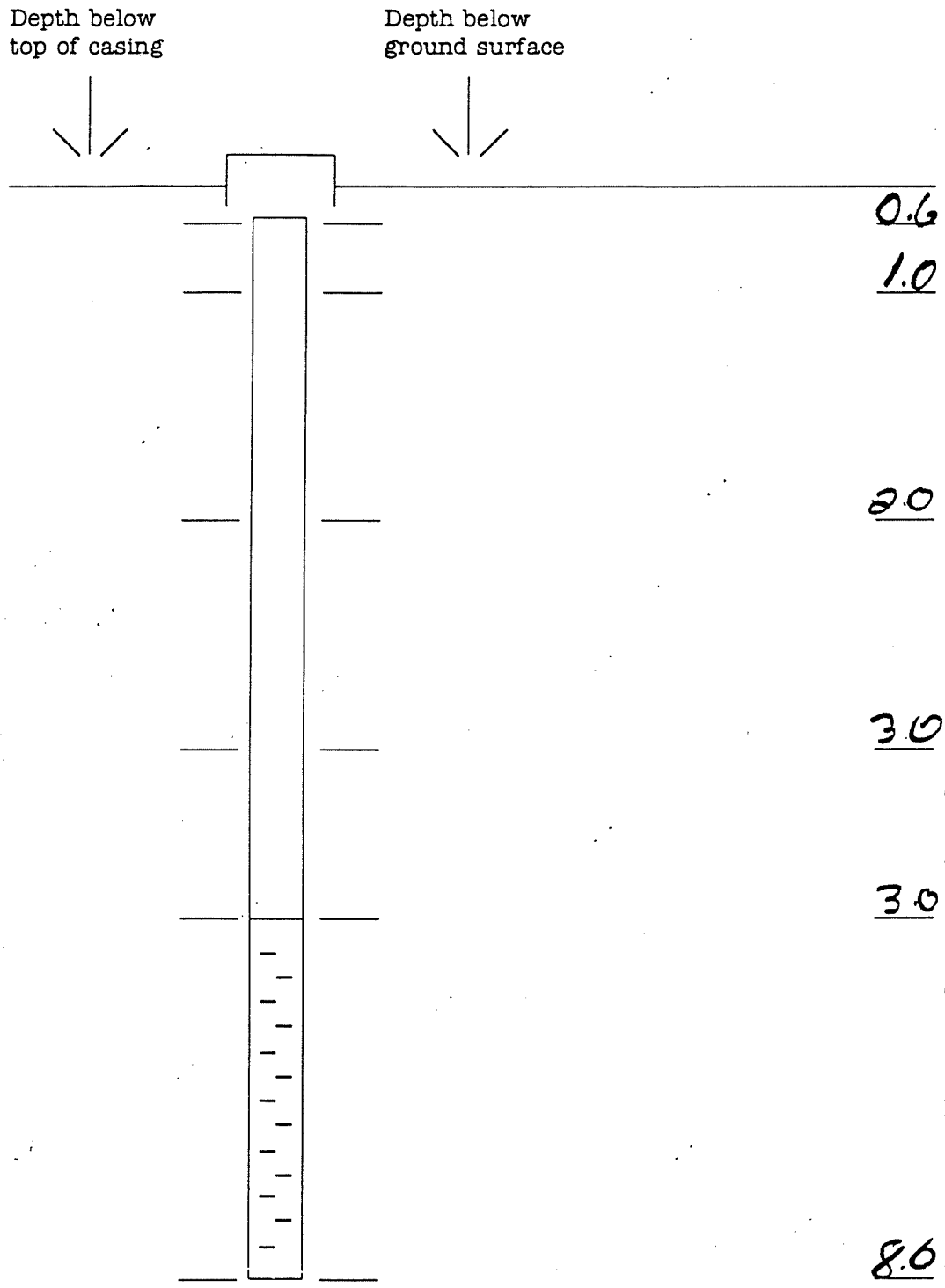
WELL # VM-1

DATE COMPLETED: 6/14/93

BORING METHOD: 4.25 HSA

BORE HOLE DIAMETER: 8.25 cm.

PROTECTOR PIPE: FLUSH MOU.



RISER PIPE
Type: PVC 2" Sch 40 FJT

Length: 2.5'

0.6 Top of Riser Pipe

1.0 Top of backfill

Type: Bentonite chip

Amount: 1 BAG

2.0 Top of Seal

Type: SILICA SAND

Amount: 1 50# LB. BAG

3.0 Top of gravel pack

Type: 3/8" WASHED PEA GRAVEL

Amount: 5-5 GAL PAILS

3.0 Top of screen

Type: PVC 2" Sch 40 FJ
20 SLOT

Length: 5'

8.6 Bottom of screen point

—X——X——X——X——X——X——X— Depth drilled (below G.S.) = 9.0

(not-to-scale)

ENVIRONMENTAL & FOUNDATION DRILLING INC.

Environmental & Foundation Drilling, Inc.

217 Raemisch Road Waunakee, WI 53597
(608) 849-9896

SOIL BORING LOG

BORING # VM-2

Date started 6 / 14 / 93
Date completed " / " / "
Page ____ of ____
JOB # 1448A

PROJECT: Cook Composites

LOCATION: 3' From Build. 7

ELEVATION ____

DEPTH 0'-0"	SOIL CLASSIFICATION & NOTES	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	MOISTURE REC		Q P
	ASPHALT	1	1.0/3.0	13,12,54	12	D	
0.7			1.0/2.5				
	BR-Silty Sand Road Base	2	3.5/5.5	2,6,9,17	19	M	
1.5			3.5/5.0				
	BL clayey silty Sand	3	6.0/8.0	4,12,15,9	9	S	
4.0			6.0/7.5				
	A Mix of BR Clayey Silty Sand,						
	Some Gravel		8.5/10				
6.0							
	BR-BL-F-To M Sand and Gravel		13.5/15				
	some silt						
			18.5/20				
9.0	EOB						
	INSTALLED WELL						

WATER LEVEL MEASUREMENTS

5.2' 1T comp.

DRILLING METHOD 4.25 HSA

SPECIAL NOTES ON BACK

POG/LLM/ORD

Environmental &
Foundation
Drilling, Inc.
217 Raemisch Road Waunakee, WI 53597
(608) 849-9896

MONITORING WELL LOG

PROJECT Cook Composites

LOCATION 9' FROM Bld NO 7

JOB # 1448A

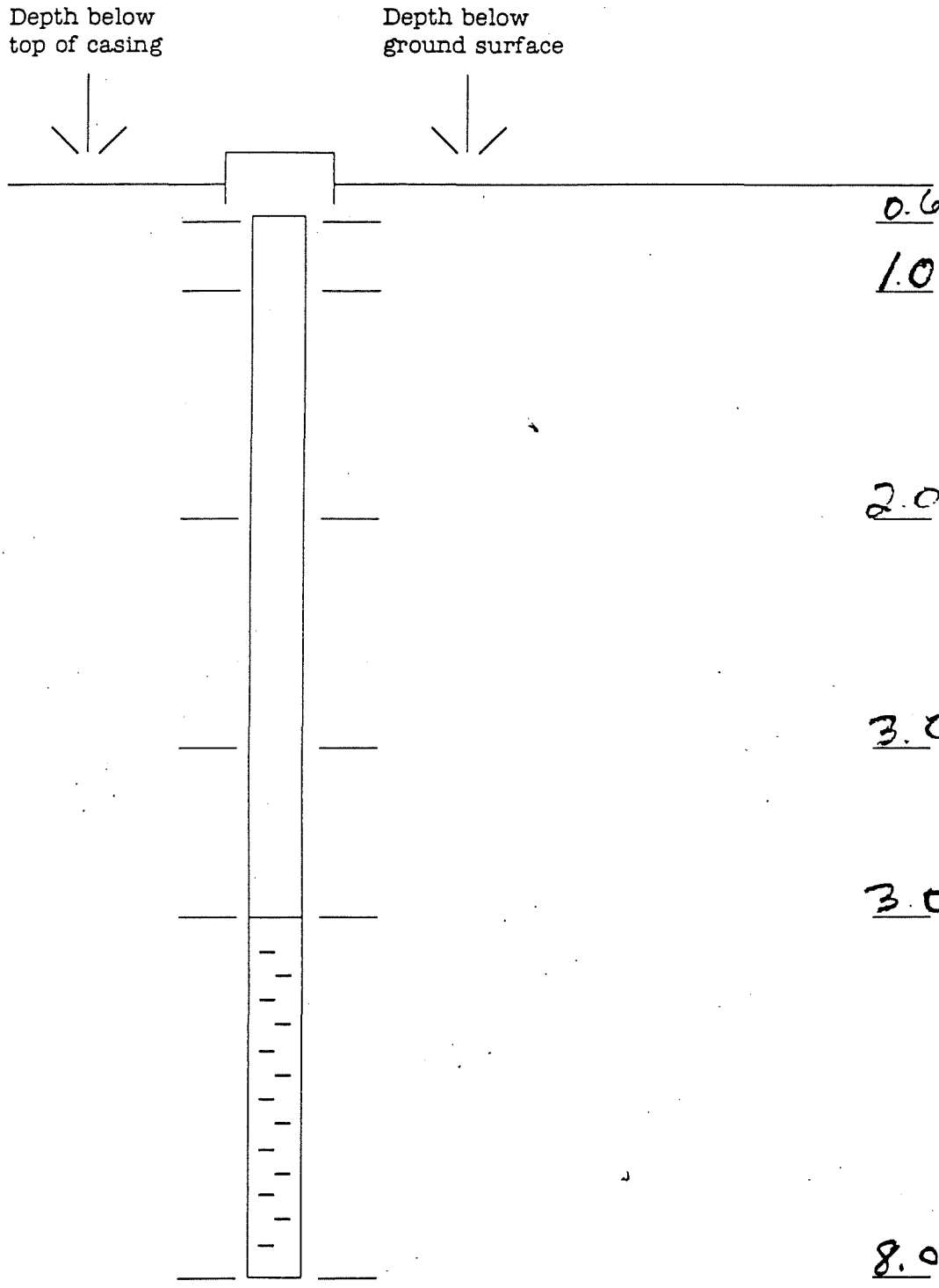
WELL # VM-2

DATE COMPLETED: 6/14/93

BORING METHOD: 4 1/4 HSA

BORE HOLE DIAMETER: 8.25 OD

PROTECTOR PIPE:
FLUSH MOUNT



RISER PIPE
Type: PVC 2" Sch 40 FJ

Length: 2.5'

0.6 Top of Riser Pipe

1.0 Top of backfill

Type: Bentonite chips

Amount: 1 BAG

2.0 Top of Seal

Type: SILICA SAND

Amount: 1 50LB. BAG

3.0 Top of gravel pack

Type: 3/8" PEA GRAVEL washed

Amount: 5-5 gal. pails

3.0 Top of screen

Type: PVC 2" sch 40
.020 SLOT

Length: 5'

8.0 Bottom of screen point

—X——X——X——X——X——X——X— Depth drilled (below G.S.) = 9.0

(not-to-scale)

ENVIRONMENTAL & FOUNDATION DRILLING INC.

Environmental & Foundation Drilling, Inc.
217 Raemisch Road Waunakee, WI 53597
(608) 849-9896

SOIL BORING LOG

BORING # VE-1

Date started 6/14/93
Date completed "/"/"
Page ____ of ____

PROJECT: Cook Composites
JOB # 1448A

LOCATION: 6' FROM FIRE ALARM
ELEVATION ____

DEPTH 0'-0"	SOIL CLASSIFICATION & NOTES	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS	MOISTURE REC		Q P
	ASPHALT	1	1.0/3.0	5,3,4,3	13	M	
0.8			1.0/2.5				
	BR-Silty SAND and GRAVEL	2	3.5/5.5	2,3,5,7	12	M	
1.5			3.5/5.0				
	BL-Silty SAND	3	6.0/8.0	8,13,8,5	11	M	
3.5			6.0/7.5				
	BR-Silty SAND, some GRAVEL	4	8.5/10.5				
			8.5/10				
9.0	E.O.B.		13.5/15				
			18.5/20				

WATER LEVEL MEASUREMENTS
5.2 ± At Comp.

DRILLING METHOD 6.25 HSA

*SPECIAL NOTES ON BACK

ROB/LLM/DRD

Environmental &
Foundation
Drilling, Inc.
217 Raemisch Road Waunakee, WI 53597
(608) 849-9896

MONITORING WELL LOG

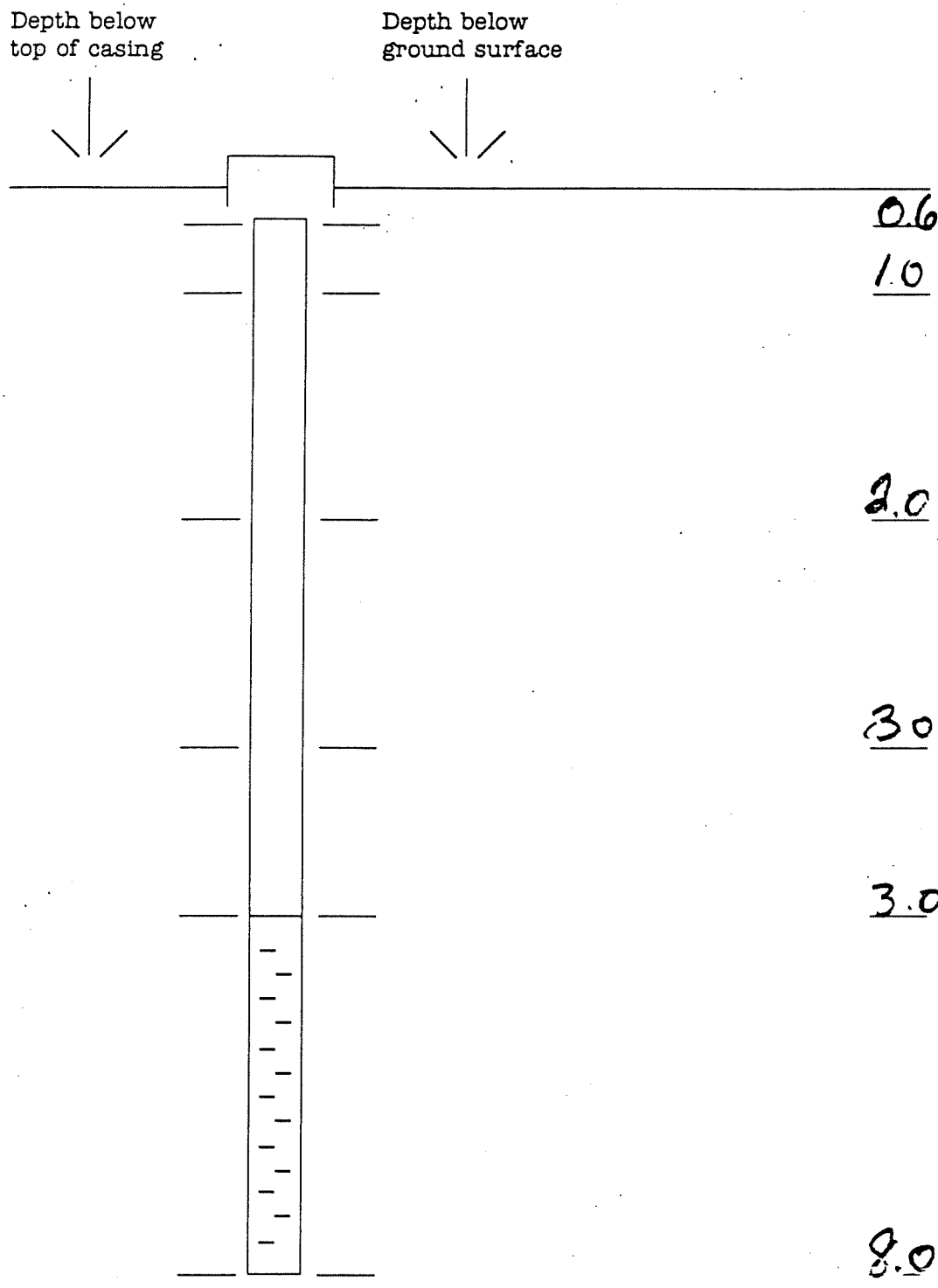
PROJECT Cook Composites

LOCATION 6' FROM FIRE ALARM

JOB # 1448 A

WELL # VE-1

DATE COMPLETED: 6/14/93
BORING METHOD: 6.25 HSA
BORE HOLE DIAMETER: 8.25 cs
PROTECTOR PIPE: FLUSH MO



RISER PIPE
Type: PVC 4" sch-80 FJ
Length: 2.5

0.6 Top of Riser Pipe

1.0 Top of backfill
Type: Bentonite chi
Amount: 1 BAG chips

2.0 Top of Seal
Type: Silica SAND
Amount: 1 50# LB BAG

3.0 Top of gravel pack
Type: 3/8 washed PEA gravel
Amount: 6 - 5 gal. pails

3.0 Top of screen
Type: PVC 4" WIREWRAP sch-80 20 SLOT
Length: 5'

9.0 Bottom of screen point

—X——X——X——X——X——X——X— Depth drilled (below G.S.) = 9.0

(not-to-scale)

ENVIRONMENTAL & FOUNDATION DRILLING INC.

222-120

Environmental & Foundation Drilling, Inc.
217 Raemisch Road Waunakee, WI 53597
(608) 849-9896

SOIL BORING LOG

BORING # VE-2

Date started 6/14/93
Date completed ''/''/'
Page ___ of ___
JOB # 1448A

PROJECT: Cook Composites

LOCATION: 18' FRom ensenadatik

ELEVATION ___

DEPTH 0'-0"	SOIL CLASSIFICATION & NOTES	SAMPLE NUMBER	DEPTH	BLOW COUNTS	MOISTURE REC		Q P
	ASPHALT	1	1.0/3.0	2222	6	M	
0.8			1.0/2.5				
	ROAD BASE silty SAND AND GRAVEL	2	3.5/5.5	2,3,5,12	18	M	
1.5			3.5/5.0				
	BL-SILTY SAND	3	6.0/8.0	13,13,16,14	15	S	
4.6			6.0/7.5				
	BR-SILTY SAND AND GRAVEL	4	8.5/10.5	3,4,7,8	7	S	
8.0			8.5/10				
	GRAY CLAY TRACE GRAVEL						
			13.5/15				
			18.5/20				
10.5	EOB.						
	INSTALLED WELL						

WATER LEVEL MEASUREMENTS

5.2' At comp

DRILLING METHOD 6.25 H

*SPECIAL NOTES ON BACK

ORO/PDG/LLM

Environmental &
Foundation
Drilling, Inc.
217 Raemisch Road Waunakee, WI 53597
(608) 849-9896

MONITORING WELL LOG

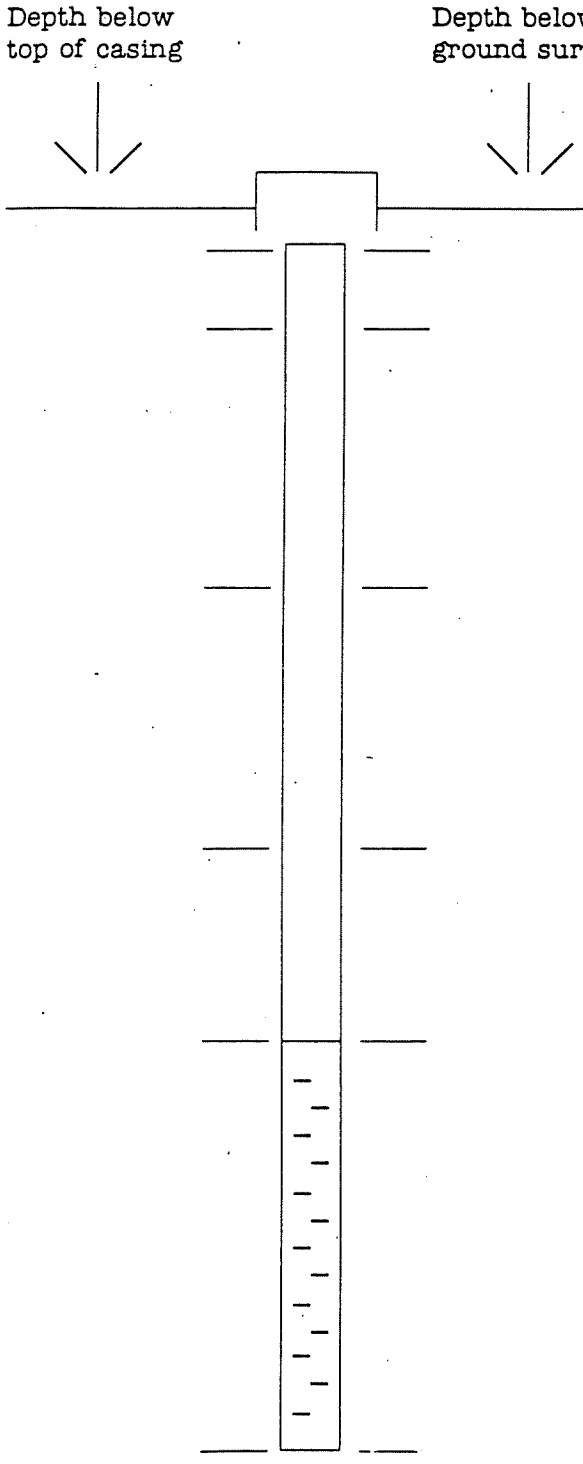
PROJECT Cook Composites

LOCATION 18' From Ensenbratich

JOB # 1448A

WELL # VE-2

DATE COMPLETED: 6/14/93
BORING METHOD: 6.25 HSA
BORE HOLE DIAMETER: 10.25 C
PROTECTOR PIPE:
FLUSH MOU.



RISER PIPE
Type: PVC 4" sch 80 FJT
Length: 2.5

0.6 Top of Riser Pipe

1.0 Top of backfill
Type: Bentonite chip
Amount: 1 BAG

3.0 Top of Seal
Type: Silica SAND
Amount: 1-50 LB BAG

2.0 Top of gravel pack
Type: 3/8" PEA Washed gravel
Amount: 6-5 gal. pails

3.0 Top of screen
Type: PVC 4" WIRERAP sch.80 .020 SLOT
Length: 5'

8.0 Bottom of screen point

—X——X——X——X——X——X——X— Depth drilled (below G.S.) = 10.5

(not-to-scale)

ENVIRONMENTAL & FOUNDATION DRILLING INC.

State of Wisconsin
Department of Natural Resources

Route to:
Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTIO

Form 4400-113A Rev. 4

Facility Project Name Cook Composites/Milwaukee	Local Grid Location of Well ☐ N. ☐ E. _____ ft. ☐ S. _____ ft. ☐ W.	Well Name VM-1
Facility License, Permit or Monitoring Number _ _ _ _ _ _ _	Grid Origin Location Lat. _ _ _ _ _ _ Long. _ _ _ _ _ _ or	Wis. Unique Well Number DNR Well Numb _ _ _ _ _ _ _ _ _ _
Type of Well Water Table Observation Well ■ 11 Piezometer ☐ 12	St. Plane _____ ft. N. _____ ft. E.	Date Well Installed 0 6 / 1 4 / 9 3
Distance Well Is From Waste Source Boundary _____ ft.	Section Location of Waste Source ☐ E. __1/4 of __1/4 of Sec. ____, T. ____ N, R. ____ ☐ W.	Well Installed By: (Person's Name & Firm) Lonnie McCauley Environmental & Foundation Drilling, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	

A. Protective Pipe, top elevation _ _ _ 0 . 0 _ ft. MSL

B. Well casing, top elevation _ _ _ 0 . 6 _ ft. MSL

C. Land surface elevation _ _ _ _ . _ ft. MSL

D. Surface seal, bottom _ _ _ _ . _ ft MSL or _ _ . _ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ■ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ■ No

14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ■ 4 1
_____ Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ■ 9 9

16. Drilling additives used? ☐ Yes ■ No
Describe _____

17. Source of water (attach analysis):
_____

E. Bentonite seal, top _ _ _ _ . _ ft. MSL or _ _ 1 0 . 0 ft.

F. Fine sand, top _ _ _ _ . _ ft. MSL or _ _ 2 0 . 0 ft.

G. Filter pack, top _ _ _ _ . _ ft. MSL or _ _ 3 0 . 0 ft.

H. Screen joint, top _ _ _ _ . _ ft. MSL or _ _ 5 0 . 0 ft.

I. Well bottom _ _ _ _ . _ ft. MSL or _ _ 8 0 . 0 ft.

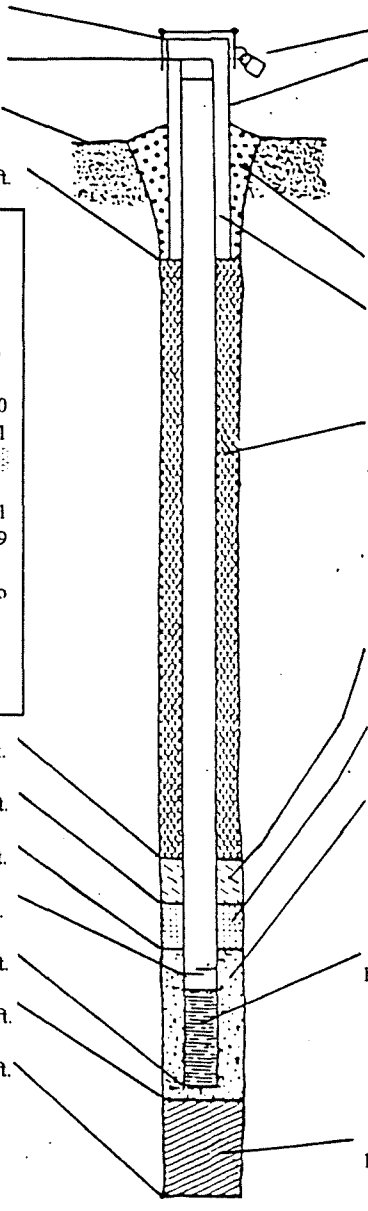
J. Filter pack, bottom _ _ _ _ . _ ft. MSL or _ _ 9 0 . 0 ft.

K. Borehole, bottom _ _ _ _ . _ ft. MSL or _ _ 9 0 . 0 ft.

L. Borehole, diameter _ 8 . 3 in.

M. O.D. well casing _ 2 . 2 _ in.

N. I.D. well casing _ 2 . 0 _ in.



1. Cap & lock? ■ Yes ☐ N
2. Protective cover pipe:
a. Inside diameter: _ 8 . 0 in
b. Length: _ 1 0 . 0 f
c. Material: Steel ■ 0
_____ Other ☐
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____
3. Surface seal: Bentonite ■ 3
Concrete ☐ 0
_____ Other ☐
4. Material between well casing & protective pipe:
Bentonite ☐ 3
Annular space seal ☐
_____ Other ☐
5. Annular space seal: a. Granular Bentonite ■ 3
b. _____ Lbs/gal mud weight..... Bentonite-sand slurry ☐ 3
c. _____ Lbs/gal mud weight..... Bentonite slurry ☐ 3
d. _____ % Bentonite..... Bentonite-cement grout ☐ 5
e. 50# Ft³ volume added for any of the above
f. How installed: Tremie ☐ 0
Tremie pumped ☐ 0
Gravity ■ 0
6. Bentonite seal: a. Bentonite granules ■ 3
b. ☐ ¼ in. ☐ ⅜ in. ☐ ½ in. Bentonite pellets ☐ 3
c. _____ Other ☐
7. Fine sand material: Manufacturer, product name and mesh size
a. Portage, Silica, Fine
b. Volume added 50# ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Pea Gravel
b. Volume added 250# ft³
9. Well casing: Flush threaded PVC schedule 40 ■ 2
Flush threaded PVC schedule 80 ☐ 2
_____ Other ☐
10. Screen Material: PVC
a. Screen Type: Factory Cut ■ 1
Continuous slot ☐ 0
_____ Other ☐
b. Manufacturer Northern Air
c. Slot size: 0 . 0 1 0 in
d. Slotted Length: _ 4 . 6 ft
11. Backfill material (below filter pack): None ☐ 1
Flint Sand Other ■

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____ Firm Environmental & Foundation Drilling, Inc.

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more that $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

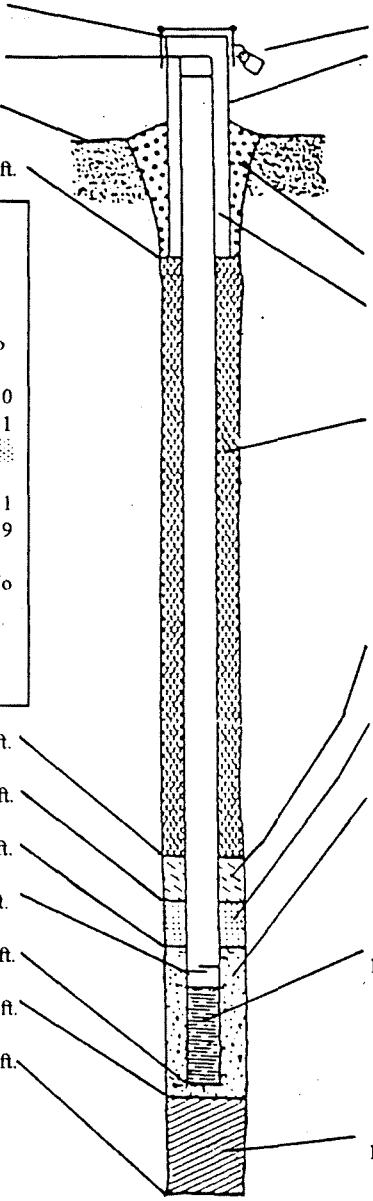
State of Wisconsin
Department of Natural Resources

Route to:
Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTIO

Form 4400-113A Rev. 4

Facility/Project Name Cook Composites/Milwaukee	Local Grid Location of Well ☐ N. ☐ E. _____ ft. ☐ S. _____ ft. ☐ W.	Well Name VM-2
Facility License, Permit or Monitoring Number _ _ _ _ _ _ _	Grid Origin Location Lat. _ _ _ _ _ Long. _ _ _ _ _ or	Wis. Unique Well Number / DNR Well Numbe _ _ _ _ _ / _ _ _
Type of Well Water Table Observation Well ■ 11 Piezometer ☐ 12	St. Plane _____ ft. N. _____ ft. E.	Date Well Installed 0 6 / 1 4 / 9 3
Distance Well Is From Waste/Source Boundary _____ ft.	Section Location of Waste/Source ☐ E. __ 1/4 of __ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ W.	Well Installed By: (Person's Name & Firm) Lonnie McCauley Environmental & Foundation Drilling, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	



A. Protective Pipe, top elevation _ _ _0.0_ ft. MSL

B. Well casing, top elevation _ _ _0.6_ ft. MSL

C. Land surface elevation _ _ _ _ _ _ ft. MSL

D. Surface seal, bottom _ _ _ _ _ ft MSL or _ _ _ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ■ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ■ No

14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ■ 4 1
_____ Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ■ 9 9

16. Drilling additives used? ☐ Yes ■ No
Describe _____

17. Source of water (attach analysis):
_____

E. Bentonite seal, top _ _ _ _ _ ft. MSL or _ _1.0 ft.

F. Fine sand, top _ _ _ _ _ ft. MSL or _ _2.0 ft.

G. Filter pack, top _ _ _ _ _ ft. MSL or _ _3.0 ft.

H. Screen joint, top _ _ _ _ _ ft. MSL or _ _5.0 ft.

I. Well bottom _ _ _ _ _ ft. MSL or _ _8.0 ft.

J. Filter pack, bottom _ _ _ _ _ ft. MSL or _ _9.0 ft.

K. Borehole, bottom _ _ _ _ _ ft. MSL or _ _9.0 ft.

L. Borehole, diameter _8.3 in.

M. O.D. well casing _2.2_ in.

N. I.D. well casing _2.0_ in.

1. Cap & lock? ■ Yes ☐ N
2. Protective cover pipe:
a. Inside diameter: _8.0 in
b. Length: _1.0 ft
c. Material: Steel ■ 0
_____ Other ☐
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____

3. Surface seal: Bentonite ■ 3
Concrete ☐ 0 1
_____ Other ☐

4. Material between well casing & protective pipe:
Bentonite ☐ 3
Annular space seal ☐
_____ Other ☐

5. Annular space seal: a. Granular Bentonite ■ 3
b. _____ Lbs/gal mud weight..... Bentonite-sand slurry ☐ 3
c. _____ Lbs/gal mud weight..... Bentonite slurry ☐ 3 1
d. _____ % Bentonite..... Bentonite-cement grout ☐ 5 0
e. 50# Ft³ volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☐ 0 2
Gravity ■ 0 8

6. Bentonite seal: a. Bentonite granules ■ 3 3
b. ☐ ¼ in. ☐ ⅜ in. ☐ ½ in. Bentonite pellets ☐ 3 2
c. _____ Other ☐

7. Fine sand material: Manufacturer, product name and mesh size
a. Portage, Silica, Fine
b. Volume added 50# ft³

8. Filter pack material: Manufacturer, product name and mesh size
a. Pea Gravel
b. Volume added 250# ft³

9. Well casing: Flush threaded PVC schedule 40 ■ 2 3
Flush threaded PVC schedule 80 ☐ 2 4
_____ Other ☐

10. Screen Material: PVC
a. Screen Type: Factory Cut ■ 1 1
Continuous slot ☐ 0 1
_____ Other ☐
b. Manufacturer Northern Air
c. Slot size: 0.010 in.
d. Slotted Length: _4.6 ft.

11. Backfill material (below filter pack): None ☐ 1 4
Flint Sand Other ■

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	Environmental & Foundation Drilling, Inc.

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with ch. 144, Wis. Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more that $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to:
Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTIO

Form 4400-113A Rev. 4

Facility/Project Name	Local Grid Location of Well	Well Name
Cook Composites/Milwaukee	☐ N. ☐ E. _____ ft. ☐ S. _____ ft. ☐ W.	VE-1
Facility License, Permit or Monitoring Number	**Grid Origin Location**	**Wis. Unique Well Number** / **DNR Well Numb**
_ _ _ _ _ _ _	Lat. _ _ _ _ _ _ Long. _ _ _ _ _ _ or	_ _ _ _ _ _ _ / _ _ _
Type of Well Water Table Observation Well ■ 11	St. Plane _____ ft. N. _____ ft. E.	**Date Well Installed**
Piezometer ☐ 12		0 6 / 1 4 / 9 3
Distance Well Is From Waste/Source Boundary	**Section Location of Waste Source** ☐ E.	**Well Installed By: (Person's Name & Firm)**
ft.	_1/4 of _1/4 of Sec. ___, T. ___ N, R. ___ ☐ W.	Lonnie McCauley
Is Well A Point of Enforcement Std. Application?	**Location of Well Relative to Waste/Source**	Environmental & Foundation Drilling, Inc.
☐ Yes ☐ No	u ☐ Upgradient s ☐ Sidegradient	
	d ☐ Downgradient n ☐ Not Known	

A. Protective Pipe, top elevation _ _ 0.0 _ ft. MSL

B. Well casing, top elevation _ _ 0.6 _ ft. MSL

C. Land surface elevation _ _ _ _ _ ft. MSL

D. Surface seal, bottom _ _ _ _ _ ft MSL or _ _ _ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ■ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ■ No

14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ■ 4 1
_____ Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ■ 9 9

16. Drilling additives used? ☐ Yes ■ No
Describe _____

17. Source of water (attach analysis):
_____

E. Bentonite seal, top _ _ _ _ _ ft. MSL or _ _ 1.0 ft.

F. Fine sand, top _ _ _ _ _ ft. MSL or _ _ 2.0 ft.

G. Filter pack, top _ _ _ _ _ ft. MSL or _ _ 3.0 ft.

H. Screen joint, top _ _ _ _ _ ft. MSL or _ _ 5.0 ft.

I. Well bottom _ _ _ _ _ ft. MSL or _ _ 8.0 ft.

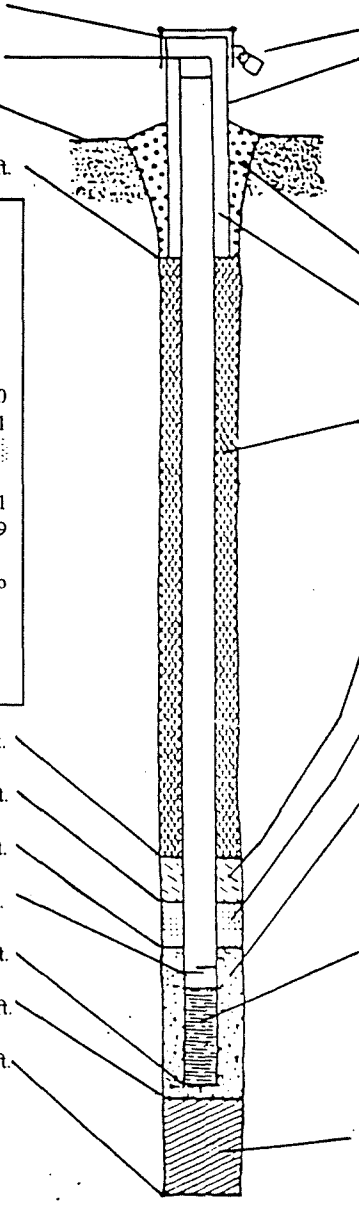
J. Filter pack, bottom _ _ _ _ _ ft. MSL or _ _ 9.0 ft.

K. Borehole, bottom _ _ _ _ _ ft. MSL or _ _ 9.0 ft.

L. Borehole, diameter _ 8.3 in.

M. O.D. well casing _ 4.2 _ in.

N. I.D. well casing _ 4.0 _ in.



1. Cap & lock? ■ Yes ☐ N
2. Protective cover pipe:
a. Inside diameter: _ 8.0
b. Length: _ 1 0
c. Material: Steel ■ 0
_____ Other ☐
d. Additional protection? ☐ Yes ☐ N
If yes, describe: _____
3. Surface seal: Bentonite ■ 3
Concrete ☐ 0
_____ Other ☐
4. Material between well casing & protective pipe:
Bentonite ☐ 3
Annular space seal ☐
_____ Other ☐
5. Annular space seal: a. Granular Bentonite ■ 3
b. _____ Lbs/gal mud weight..... Bentonite-sand slurry ☐ 3
c. _____ Lbs/gal mud weight..... Bentonite slurry ☐ 3
d. _____ % Bentonite..... Bentonite-cement grout ☐ 5
e. 50# Ft³ volume added for any of the above
f. How installed: Tremie ☐ 0
Tremie pumped ☐ 0
Gravity ■ 0
6. Bentonite seal: a. Bentonite granules ■ 3
b. ☐ ¼ in. ☐ ⅜ in. ☐ ½ in. Bentonite pellets ☐ 3
c. _____ Other ☐
7. Fine sand material: Manufacturer, product name and mesh size
a. Portage, Silica, Fine
b. Volume added 50# ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Pea Gravel
b. Volume added 300# ft³
9. Well casing: Flush threaded PVC schedule 40 ☐ 2
Flush threaded PVC schedule 80 ■ 2
_____ Other ☐
10. Screen Material: PVC
a. Screen Type: Factory Cut ■ 1
Continuous slot ☐ 0
_____ Other ☐
b. Manufacturer Northern Air
c. Slot size: 0.010 in
d. Slotted Length: _ 4.6 ft
11. Backfill material (below filter pack): None ☐ 1
Flint Sand Other ■

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	Environmental & Foundation Drilling, Inc.

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more that $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

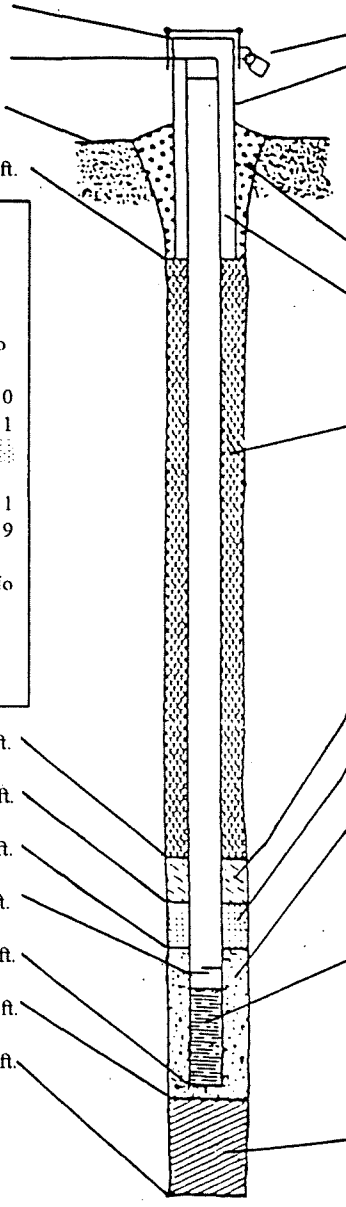
State of Wisconsin
Department of Natural Resources

Route to:
Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTIO

Form 4400-113A Rev. 4-

Facility/Project Name Cook Composites/Milwaukee	Local Grid Location of Well ☐ N. ☐ E. _____ ft. ☐ S. _____ ft. ☐ W.	Well Name VE-2
Facility License, Permit or Monitoring Number _ _ _ _ _ _ _	Grid Origin Location Lat. ___ ___ ___ Long. ___ ___ ___ or	Wis. Unique Well Number / DNR Well Numbe _ _ _ _ _ _ _ / _ _ _
Type of Well: Water Table Observation Well ■ 11 Piezometer ☐ 12	St. Plane _____ ft. N. _____ ft. E.	Date Well Installed 0 6 / 1 4 / 9 3
Distance Well Is From Waste/Source Boundary . ft.	Section Location of Waste/Source ☐ E. __1/4 of __1/4 of Sec. ____, T. ____ N, R. ____ ☐ W.	Well Installed By: (Person's Name & Firm) Lonnie McCauley Environmental & Foundation Drilling, Inc.
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known	



A. Protective Pipe, top elevation ___0.0_ ft. MSL

B. Well casing, top elevation ___0.6_ ft. MSL

C. Land surface elevation _____. ft. MSL

D. Surface seal, bottom ____._ ft MSL or ___. ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ■ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ■ No

14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ■ 4 1
_____ Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ■ 9 9

16. Drilling additives used? ☐ Yes ■ No
Describe _____

17. Source of water (attach analysis):
_____

E. Bentonite seal, top ____._ ft. MSL or __1.0 ft.

F. Fine sand, top ____._ ft. MSL or __2.0 ft.

G. Filter pack, top ____._ ft. MSL or __3.0 ft.

H. Screen joint, top ____._ ft. MSL or __5.0 ft.

I. Well bottom ____._ ft. MSL or __8.0 ft.

J. Filter pack, bottom ____._ ft. MSL or __8.0 ft.

K. Borehole, bottom ____._ ft. MSL or __9.0 ft.

L. Borehole, diameter _8.3 in.

M. O.D. well casing _4.2_ in.

N. I.D. well casing _4.0_ in.

1. Cap & lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: _8.0 in
b. Length: _1 0 ft
c. Material: Steel ■ 0
_____ Other ☐
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____

3. Surface seal: Bentonite ■ 3
Concrete ☐ 0
_____ Other ☐

4. Material between well casing & protective pipe:
Bentonite ☐ 3
Annular space seal ☐
_____ Other ☐

5. Annular space seal: a. Granular Bentonite ■ 3
b. _____ Lbs/gal mud weight..... Bentonite-sand slurry ☐ 3
c. _____ Lbs/gal mud weight..... Bentonite slurry ☐ 3
d. _____ % Bentonite..... Bentonite-cement grout ☐ 5
e. 50# Ft³ volume added for any of the above
f. How installed: Tremie ☐ 0
Tremie pumped ☐ 0
Gravity ■ 0

6. Bentonite seal: a. Bentonite granules ■ 3
b. ☐ ¼ in. ☐ ⅜ in. ☐ ½ in. Bentonite pellets ☐ 3
c. _____ Other ☐

7. Fine sand material: Manufacturer, product name and mesh size
a. Portage, Silica, Fine
b. Volume added 50# ft³

8. Filter pack material: Manufacturer, product name and mesh size
a. Pea Gravel
b. Volume added 300# ft³

9. Well casing: Flush threaded PVC schedule 40 ☐ 2
Flush threaded PVC schedule 80 ■ 2
_____ Other ☐

10. Screen Material: PVC
a. Screen Type: Factory Cut ■ 1
Continuous slot ☐ 0
_____ Other ☐
b. Manufacturer Northern Air
c. Slot size: 0.010 in.
d. Slotted Length: _4.6 ft.

11. Backfill material (below filter pack): None ☐ 1
Flint Sand Other ■

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	Environmental & Foundation Drilling, Inc.

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch. 144, Wis. Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more that $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

APPENDIX B

SVE WELL SOIL LABORATORY RESULTS

RMT INC.
LABORATORIES

SAMPLE NARRATIVE
VOLATILE ORGANIC GC ANALYSIS

PROJECT NAME: CCP
PROJECT NUMBER: 1832.42
SAMPLE NUMBER(S): 1724-004
ANALYSIS TYPE: 8020
DATE: 07/12/93

Sample number 1724-004 had surrogate* recoveries that were outside acceptable limits. The recoveries achieved in the analyses were as follows:

Sample Number	Surrogate	Recovery Analysis 1 (%)	Recovery Analysis 2 (%)	Acceptable Recovery (%)	Analysis Reported
1724-004	1,4-Difluorobenzene	99	85	45-121	2nd
	3-Chlorotoluene	316	132	44-118**	

* Surrogates are organic compounds that are similar to analytes of interest in chemical composition, extraction, and chromatography, but that are not normally found in environmental samples. These compounds are spiked into all blanks, standards, samples, and spiked samples before analysis (USEPA SW846 9/86 3rd edition).

** There can be a number of reasons for surrogate "failure." It is not uncommon to encounter "low" surrogate recoveries during the analysis of soil samples because some soil constituents (i.e., clays) have an affinity to absorb the surrogate compounds. "High" surrogate recovery (more apparent surrogate is measured than what was added to the sample) can be caused by other compound(s) in the sample eluting at the same time as the surrogate, or more commonly encountered, by a relatively dirty sample being analyzed with many non-targeted compounds, which elute through the gas chromatograph column and effectively raise the "baseline" measure. In this case, sample VE-1 3.5-5.5', had a relatively clean chromatogram, and the apparent "high" surrogate recovery was probably a result of a single non-target compound co-eluting with the 3-chlorotoluene (there was also evidence of a few other non-target compound peaks present in other areas of the chromatogram). Because of this, we believe that the measured amounts of ethylbenzene and xylene are not substantively affected by the "high" surrogate recovery in sample VE-1 3.5-5.5' and that the data are usable for the objectives of this study.

RMT INC
LABORATORIES

CLIENT: CCP
SAMPLE #: 1724-003
PROJECT #: 01832.42
WORK ORDER #: 1724
WI DNR LAB ID: 113138520

REPORT DATE: 07/12/93
COLLECTION DATE: 06/14/93
STATION ID: VE-1 1-3'

VOLATILE ORGANIC ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Benzene	<220	ug/kg dry wt.
Toluene	<220	ug/kg dry wt.
Chlorobenzene	<220	ug/kg dry wt.
Ethylbenzene	420	ug/kg dry wt.
Xylene, total	11000	ug/kg dry wt.
1,3-Dichlorobenzene	<220	ug/kg dry wt.
1,2-Dichlorobenzene	<220	ug/kg dry wt.
1,4-Dichlorobenzene	<220	ug/kg dry wt.

Kevin P. Meade 7/12/93
Approval Signature

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RMT INC.
LABORATORIES

CLIENT: CCP
SAMPLE #: 1724-004
PROJECT #: 01832.42
WORK ORDER #: 1724
WI DNR LAB ID: 113138520

REPORT DATE: 07/12/93
COLLECTION DATE: 06/14/93
STATION ID: VE-1 3.5-5.5'

VOLATILE ORGANIC ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Benzene	<56 F	ug/kg dry wt.
Toluene	<56 F	ug/kg dry wt.
Chlorobenzene	<56 F	ug/kg dry wt.
Ethylbenzene	180 F	ug/kg dry wt.
Xylene, total	1900 F	ug/kg dry wt.
1,3-Dichlorobenzene	<56 F	ug/kg dry wt.
1,2-Dichlorobenzene	<56 F	ug/kg dry wt.
1,4-Dichlorobenzene	<56 F	ug/kg dry wt.

Kevin P. Mack 7/12/93
Approval Signature

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RMT INC
LABORATORIES

CLIENT: CCP
SAMPLE #: 1724-005
PROJECT #: 01832.42
WORK ORDER #: 1724
WI DNR LAB ID: 113138520

REPORT DATE: 07/12/93
COLLECTION DATE: 06/14/93
STATION ID: VE-1 6-8'

VOLATILE ORGANIC ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Benzene	<6000	ug/kg dry wt.
Toluene	12000	ug/kg dry wt.
Chlorobenzene	<6000	ug/kg dry wt.
Ethylbenzene	37000	ug/kg dry wt.
Xylene, total	160000	ug/kg dry wt.
1,3-Dichlorobenzene	<6000	ug/kg dry wt.
1,2-Dichlorobenzene	<6000	ug/kg dry wt.
1,4-Dichlorobenzene	<6000	ug/kg dry wt.

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Approval Signature

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RMT INC
LABORATORIES

CLIENT: CCP
SAMPLE #: 1724-006
PROJECT #: 01832.42
WORK ORDER #: 1724
WI DNR LAB ID: 113138520

REPORT DATE: 07/12/93
COLLECTION DATE: 06/14/93
STATION ID: VE-1 8.5-10.5'

VOLATILE ORGANIC ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Benzene	<6000	ug/kg dry wt.
Toluene	24000	ug/kg dry wt.
Chlorobenzene	<6000	ug/kg dry wt.
Ethylbenzene	35000	ug/kg dry wt.
Xylene, total	160000	ug/kg dry wt.
1,3-Dichlorobenzene	<6000	ug/kg dry wt.
1,2-Dichlorobenzene	<6000	ug/kg dry wt.
1,4-Dichlorobenzene	<6000	ug/kg dry wt.

Kevin P. Meade 7/12/93
Approval Signature

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RMT INC
LABORATORIES

CLIENT: CCP
SAMPLE #: 1724-007
PROJECT #: 01832.42
WORK ORDER #: 1724
WI DNR LAB ID: 113138520

REPORT DATE: 07/12/93
COLLECTION DATE: 06/14/93
STATION ID: VE-2 1-3'

VOLATILE ORGANIC ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Benzene	<290000	ug/kg dry wt.
Toluene	<290000	ug/kg dry wt.
Chlorobenzene	<290000	ug/kg dry wt.
Ethylbenzene	600000	ug/kg dry wt.
Xylene, total	3100000	ug/kg dry wt.
1,3-Dichlorobenzene	<290000	ug/kg dry wt.
1,2-Dichlorobenzene	<290000	ug/kg dry wt.
1,4-Dichlorobenzene	<290000	ug/kg dry wt.

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Approval Signature

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RMT INC
LABORATORIES

CLIENT: CCP
SAMPLE #: 1724-008
PROJECT #: 01832.42
WORK ORDER #: 1724
WI DNR LAB ID: 113138520

REPORT DATE: 07/12/93
COLLECTION DATE: 06/14/93
STATION ID: VE-2 3.5-5.5'

VOLATILE ORGANIC ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Benzene	<280000	ug/kg dry wt.
Toluene	<280000	ug/kg dry wt.
Chlorobenzene	<280000	ug/kg dry wt.
Ethylbenzene	840000	ug/kg dry wt.
Xylene, total	3900000	ug/kg dry wt.
1,3-Dichlorobenzene	<280000	ug/kg dry wt.
1,2-Dichlorobenzene	<280000	ug/kg dry wt.
1,4-Dichlorobenzene	<280000	ug/kg dry wt.

Kevin P. Meech 7/12/93
Approval Signature

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RMT INC.
LABORATORIES

CLIENT: CCP
SAMPLE #: 1724-009
PROJECT #: 01832.42
WORK ORDER #: 1724
WI DNR LAB ID: 113138520

REPORT DATE: 07/12/93
COLLECTION DATE: 06/14/93
STATION ID: VE-2 6-8'

VOLATILE ORGANIC ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Benzene	<110000	ug/kg dry wt.
Toluene	<110000	ug/kg dry wt.
Chlorobenzene	<110000	ug/kg dry wt.
Ethylbenzene	300000	ug/kg dry wt.
Xylene, total	1200000	ug/kg dry wt.
1,3-Dichlorobenzene	<110000	ug/kg dry wt.
1,2-Dichlorobenzene	<110000	ug/kg dry wt.
1,4-Dichlorobenzene	<110000	ug/kg dry wt.

Kevin P. Meeh 7/12/93
Approval Signature

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RMT INC.
LABORATORIES

Organic GC Data Qualifier Sheet

B(n)	Analyte present in the method blank. If the processes that were applied to the sample were applied to the method blank, the value of the analyte in the method blank would likely be "n".
C	Elevated detection limit (see Case Narrative).
E	Analyte concentration exceeds calibration range (see Case Narrative).
F	Repeated surrogate failure (see Case Narrative).
H(n)	Analysis performed "n" days past holding time.
NR	Not required.
P	Sample vial used for previous analysis.
R	Relative percent difference high (see Case Narrative).
T	Retention time variance; analyte identification not confirmed.
W	Sample received with headspace.

Effective 06/15/93

APPENDIX C

SVE WELL SOIL CHARACTERISTICS

RMT Soils Laboratory - Moisture Content Determination

PROJECT:CCP

JOB #:1832.42

Tech: DEO 06/21/93 QC DLH 6-23-93
Input: DLH 06/22/93 QA DLH 6-28-93

BORING	SAMPLE	DEPTH	TARE	WET WT	DRY WT	% MOISTURE
VE-1		1-3'	84.78	340.93	321.35	8.3
VE-1		3.5-5.5'	83.30	255.73	233.30	15.0
VE-1		6-8'	84.18	255.42	240.11	9.8
VE-2		1-3'	86.81	203.08	188.99	13.8
VE-2		3.5-5.5'	86.56	380.56	330.18	20.7
VE-2		6-8'	87.43	352.40	329.23	9.6
VE-2		8.5-10.5'	86.70	235.32	211.35	19.2

RMT Soils Laboratory - Atterberg Limit Determination

PROJECT: CCP

JOB #: 1832.42

Tech: DEO 06/21/93 QC 4WJ 6-25-93
Input: DLH 06/25/93 QA DLH 6-28-93

BORING: VE-1 DEPTH: 1-3'

	Natural Moisture	LIQUID LIMIT		OVEN LL	PLASTIC LIMIT
TARE		115.39	114.57		114.59
BLOWS		24	24		
WET WT		142.10	143.02		188.52
DRY WT		137.81	138.45		178.39
% WATER		19.0	19.0		15.9

BORING	VE-1
DEPTH	1-3'
% WATER	
LL	19
PL	16
PI	3
CLASS	ML

BORING: VE-1 DEPTH: 3.5-5-5'

	Natural Moisture	LIQUID LIMIT		OVEN LL	PLASTIC LIMIT
TARE		116.34	115.07		114.93
BLOWS		26	28		
WET WT		143.12	143.69		183.23
DRY WT		138.39	138.65		173.68
% WATER		21.6	21.7		16.3

BORING	VE-1
DEPTH	3.5-5-5'
% WATER	
LL	22
PL	16
PI	6
CLASS	CL-ML

BORING: VE-1 DEPTH: 6-8'

	Natural Moisture	LIQUID LIMIT		OVEN LL	PLASTIC LIMIT
TARE		114.01	115.13		
BLOWS		23	23	NO P.L.	
WET WT		143.16	147.18		
DRY WT		139.36	142.95		
% WATER		14.8	15.1		

BORING	VE-1
DEPTH	6-8'
% WATER	
LL	15
PL	0
PI	NP
CLASS	NP

RMT Soils Laboratory - Atterberg Limit Determination

PROJECT: CCP

JOB #: 1832.42

Tech: DEO 06/21/93 QC
Input: DLH 06/25/93 QA

By Date
6-25-93
6-28-93

BORING: VE-2 DEPTH: 1-3'

	Natural Moisture	LIQUID LIMIT		OVEN DRY LL	PLASTIC LIMIT
TARE		115.41	114.36		115.32
BLOWS		23	24		
WET WT		140.19	139.12		166.74
DRY WT		132.98	131.93		156.57
% WATER		40.6	40.7		24.7

BORING	VE-2
DEPTH	1-3'
% WATER	
LL	41
PL	25
PI	16
CLASS	CL

BORING: VE-2 DEPTH: 3.5-5.5'

	Natural Moisture	LIQUID LIMIT		OVEN DRY LL	PLASTIC LIMIT
TARE		115.47	114.19		115.98
BLOWS		26	26		
WET WT		144.76	142.51		171.22
DRY WT		137.62	135.61		162.05
% WATER		32.4	32.4		19.9

BORING	VE-2
DEPTH	3.5-5.5'
% WATER	
LL	32
PL	20
PI	12
CLASS	CL

USE CURSOR

BORING: VE-2 DEPTH: 6-8'

	Natural Moisture	LIQUID LIMIT		OVEN DRY LL	PLASTIC LIMIT
TARE		115.60	116.35		115.39
BLOWS		22	24		
WET WT		143.87	142.97		182.88
DRY WT		138.87	138.30		172.56
% WATER		21.2	21.2		18.1

BORING	VE-2
DEPTH	6-8'
% WATER	
LL	21
PL	18
PI	3
CLASS	ML

RMT Soils Laboratory - Atterberg Limit Determination

PROJECT: CCP

JOB #: 1832.42

Tech: DEO 06/21/93 QC
Input: DLH 06/25/93 QA

By Date

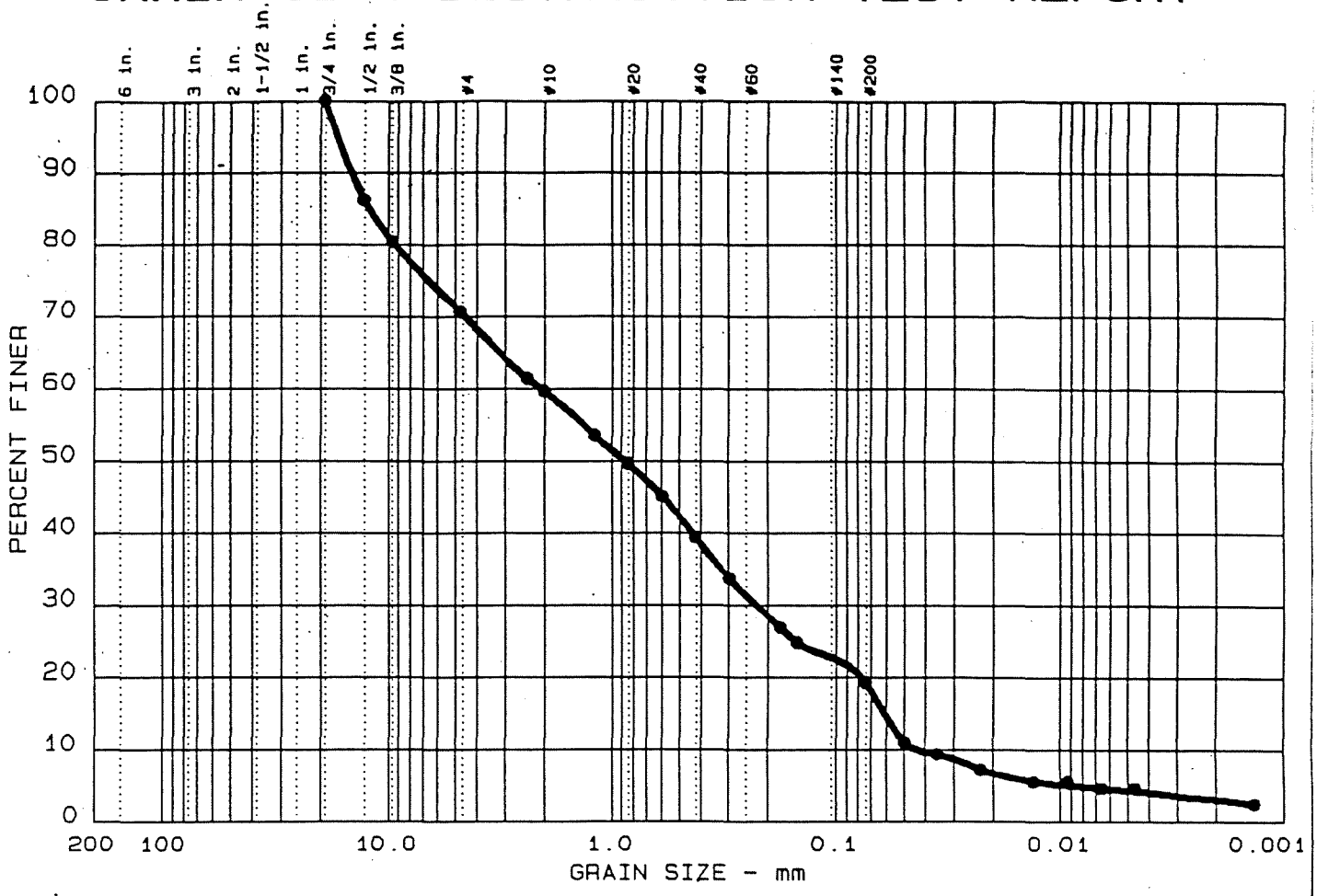
BORING: VE-2 DEPTH: 8.5-10.5'

	Natural Moisture	LIQUID LIMIT		OVEN LL	PLASTIC LIMIT
TARE		115.24	114.22		114.32
BLOWS		23	24		
WET WT		144.85	144.24		182.22
DRY WT		138.22	137.51		173.11
% WATER		28.6	28.8		15.5

BORING	VE-2
DEPTH	8.5-10.5'
% WATER	
LL	29
PL	15
PI	14
CLASS	CL

✓ DLH 6-30-93
✓ HDK 7-1-93

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	2	0.0	29.3	51.3	15.1	4.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	19	3	12.02	2.07	0.87	0.226	0.0603	0.0437	0.57	47.3

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty sand with gravel	SM	

Project No.: 1832.42
Project: CCP
● Location: VE-1, 1-3'

Date: 06-28-93

Remarks:

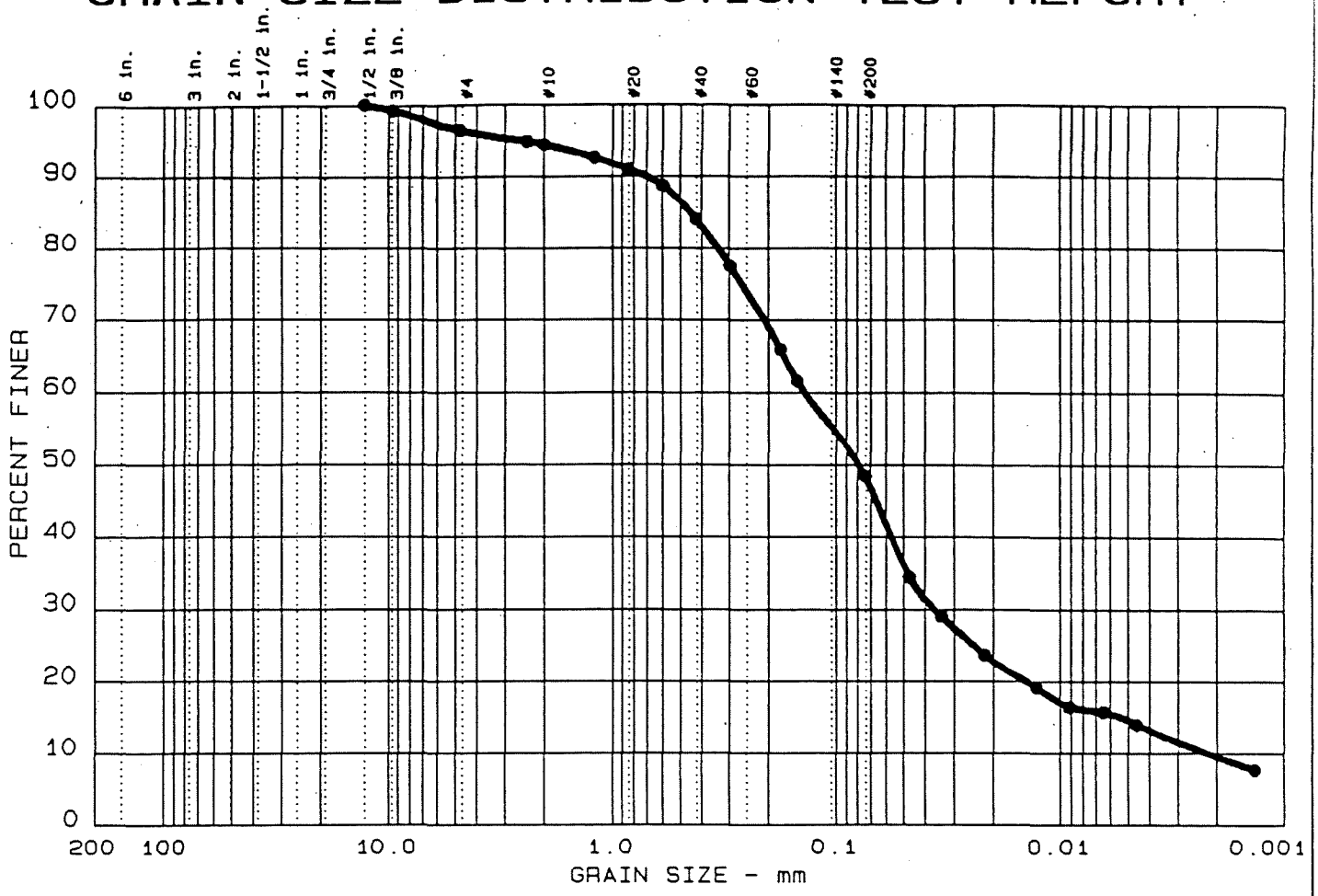
GRAIN SIZE DISTRIBUTION TEST REPORT

RMT, INC.

Figure No. _____

✓ DLH 6-30-93
✓ DK 7-1-93

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	3.5	48.1	33.8	14.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	22	6	0.44	0.14	0.08	0.036	0.0054	0.0022	4.37	63.1

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty, clayey sand	SC-SM	

Project No.: 1832.42
Project: CCP
● Location: VE-1, 3.5-5.5'

Date: 06-28-93

Remarks:

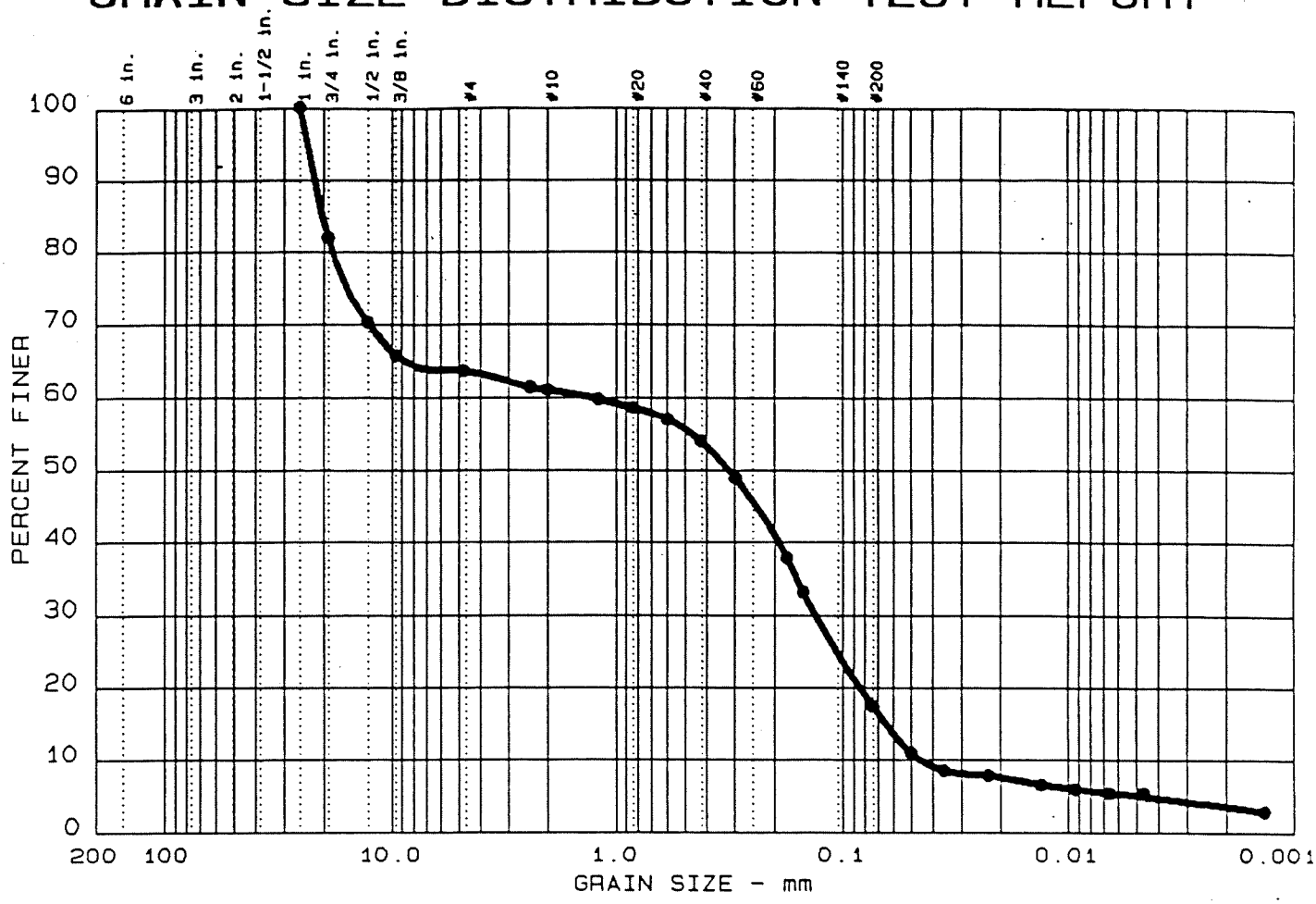
GRAIN SIZE DISTRIBUTION TEST REPORT

RMT, INC.

Figure No. _____

✓ dd 7-1-93

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	4	0.0	36.3	46.2	12.4	5.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
●	NP	NP	20.14	1.26	0.32	0.132	0.0644	0.0451	0.31	27.9

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty sand with gravel	SM	

Project No.: 1832.42
Project: CCP
● Location: VE-1, 6-8'

Date: 06-28-93

GRAIN SIZE DISTRIBUTION TEST REPORT

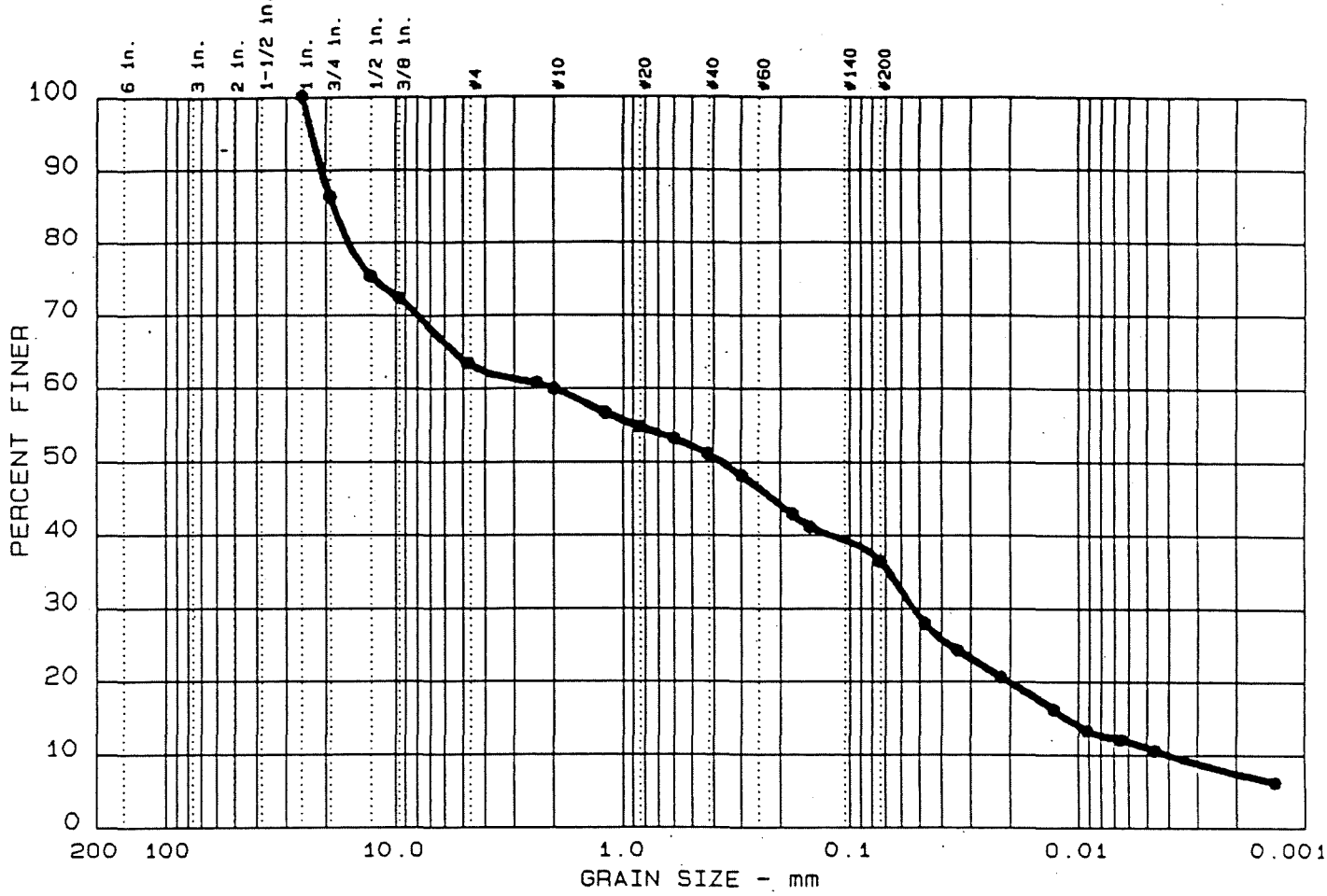
RMT, INC.

Remarks:

Figure No. _____

✓ AH 6-30-93
✓ DB 7-1-93

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	5	0.0	36.5	27.1	25.4	11.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	41	16	18.41	2.00	0.36	0.053	0.0112	0.0040	0.35	501.2

MATERIAL DESCRIPTION	USCS	AASHTO
● Clayey gravel with sand	GC	

Project No.: 1832.42
Project: CCP
● Location: VE-2, 1-3'

Date: 06-28-93

Remarks:

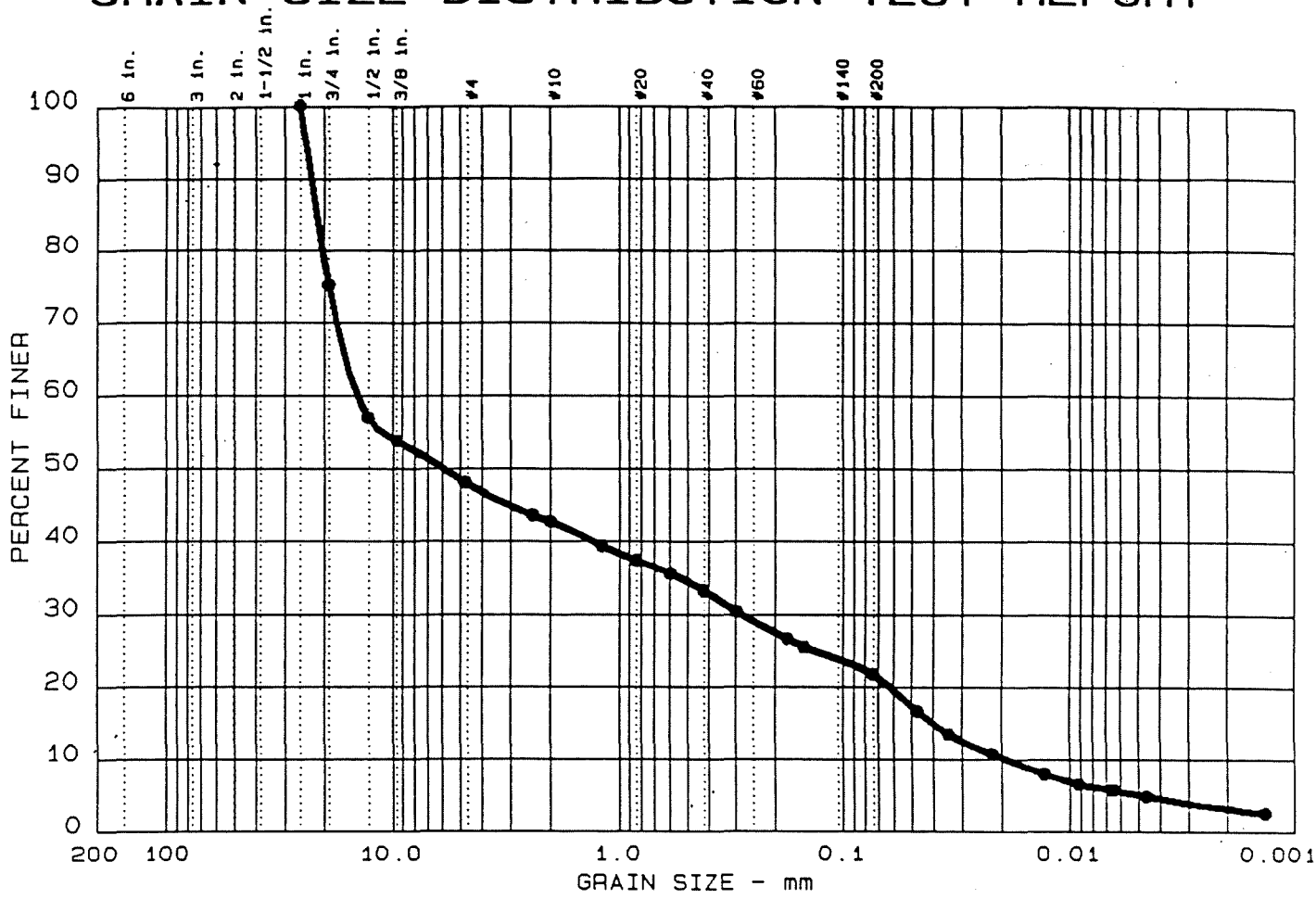
GRAIN SIZE DISTRIBUTION TEST REPORT

RMT, INC.

Figure No. _____

✓ DLH 6-30-93
✓ HH 7-1-93

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	7	0.0	52.0	26.3	16.7	5.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	21	3	21.50	14.21	5.92	0.283	0.0400	0.0189	0.30	749.9

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty gravel with sand	GM	

Project No.: 1832.42
Project: CCP
● Location: VE-2, 6-8'

Date: 06-28-93

Remarks:

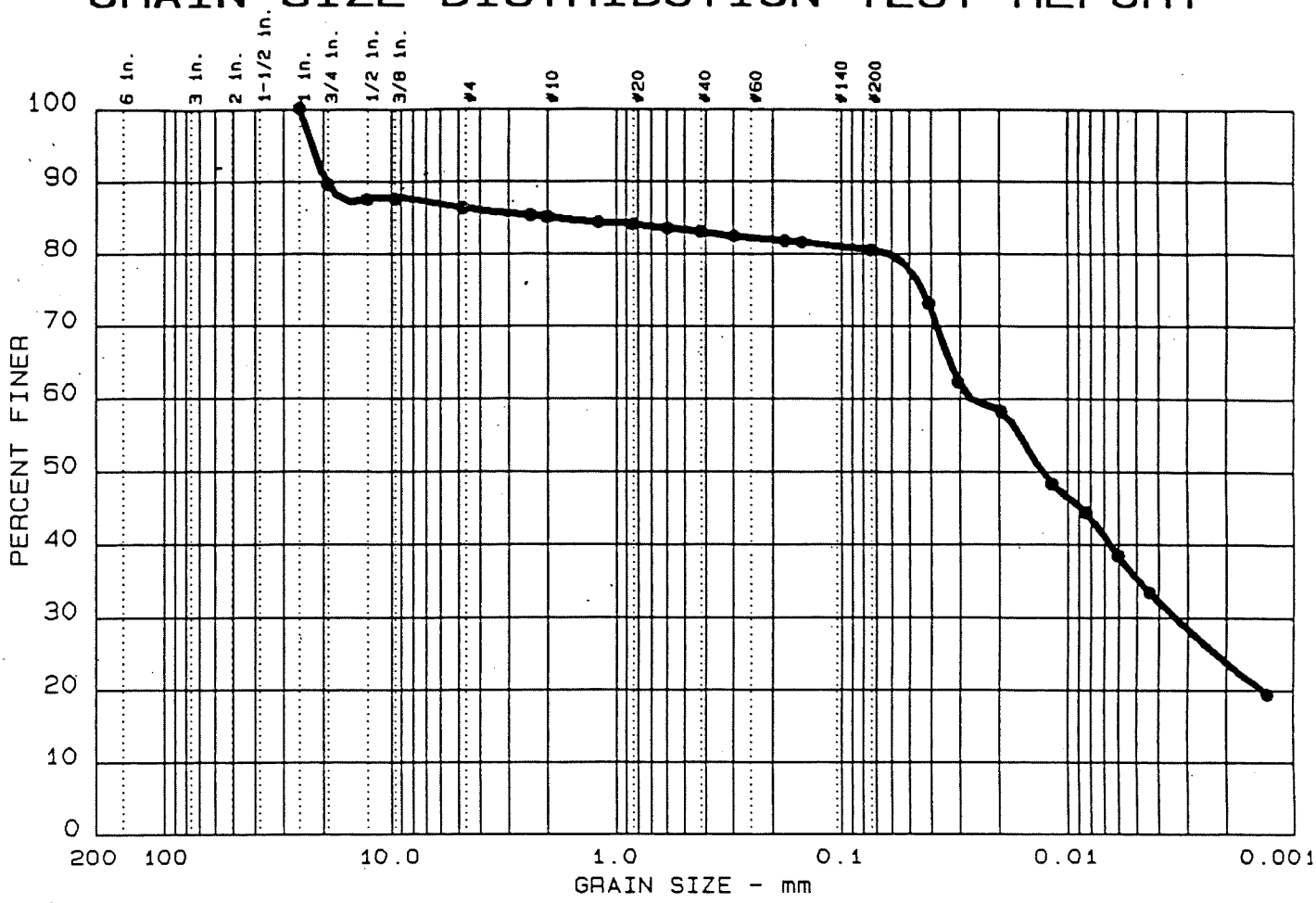
GRAIN SIZE DISTRIBUTION TEST REPORT

RMT, INC.

Figure No. _____

DCH 7-2-93
JBH 7-2-93

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	8	0.0	13.6	5.9	45.3	35.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	29	14	1.78		0.01	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
● Lean clay with gravel	CL	

Project No.: 1832.42
Project: CCP
● Location: VE-2, 8.5-10.5'

Date: 06-28-93

GRAIN SIZE DISTRIBUTION TEST REPORT

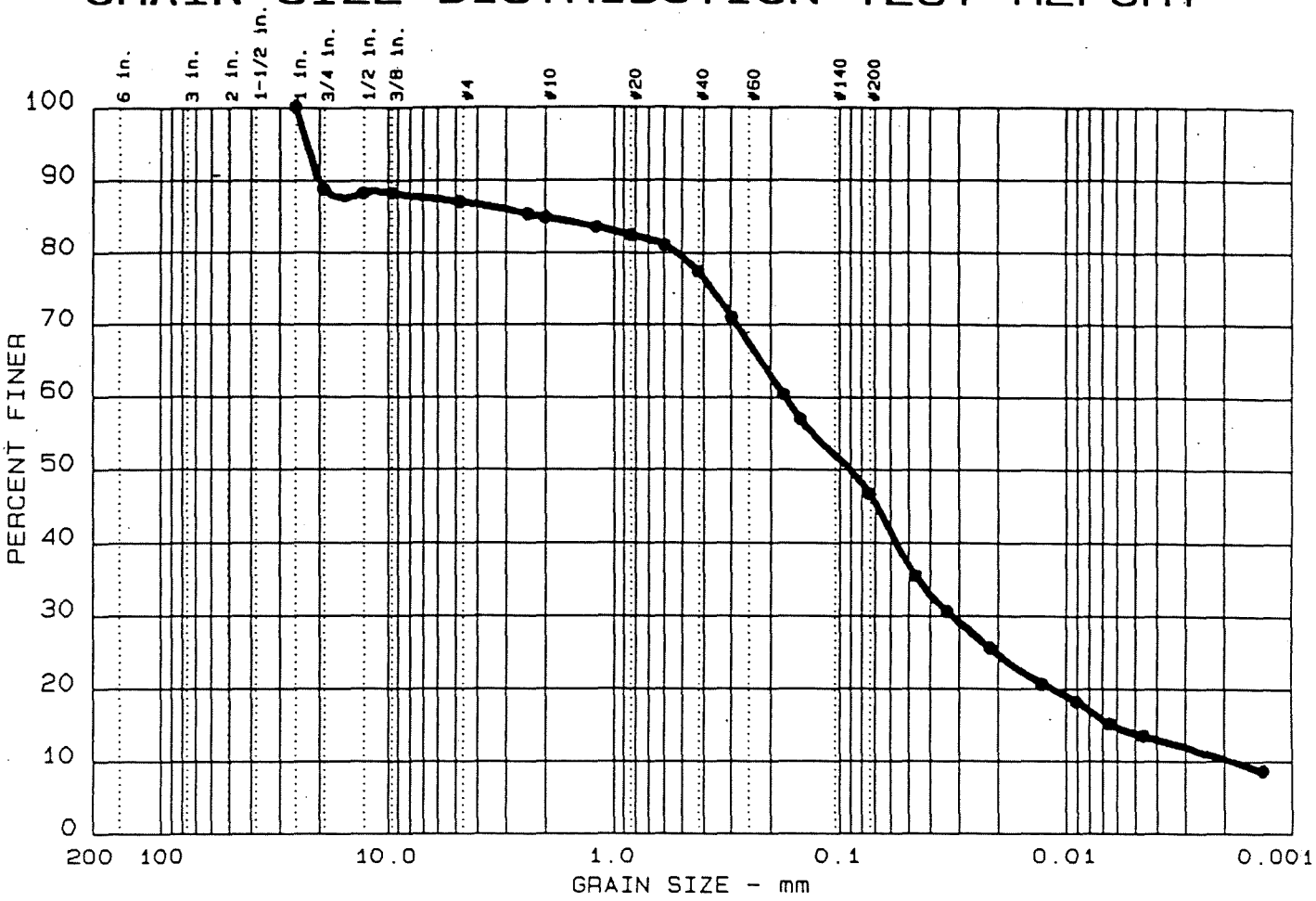
RMT, INC.

Remarks:

Figure No. _____

✓ HJW 7-2-93 ✓ SHT 7-2-93

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	6	0.0	12.9	40.5	32.7	13.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
●	32	12	2.04	0.17	0.09	0.032	0.0063	0.0018	3.24	95.5

MATERIAL DESCRIPTION	USCS	AASHTO
● Clayey sand	SC	

Project No.: 1832.42
Project: CCP
● Location: VE-2, 3.5-5.5'

Date: 06-28-93

GRAIN SIZE DISTRIBUTION TEST REPORT

RMT, INC.

Remarks:

Figure No. _____

APPENDIX D

GC QUALITY ASSURANCE AND CONTROL MEASURES

APPENDIX D

GC QUALITY ASSURANCE AND CONTROL MEASURES

Quality assurance and control for the gas analysis included the following steps:

- The run (series of samples) is started with an instrument blank and syringe blank. A standard is injected for calibration. Two different instrument libraries were used to keep soil and water calibration separate.
- Gas from the sample bottles was injected and analyzed. Injections were repeated until the peaks of interest were on scale. If there were any questions about an injection, it was repeated until the measurement was duplicated to within 15 percent.
- Syringe cleanliness was checked by injecting room air whenever there was a question regarding syringe contamination. If syringe contamination was found, the syringe needle was replaced, the syringe was cleaned with air, and the syringe was rechecked before being put back into service.
- Sample VOC concentrations from duplicated runs were recorded on sample data sheets and stored with the GC operating sheets in the GC analysis project notebook.
- Every GC injection was recorded on the GC operations sheets, with information on the injection number, injection time, injection volume, gain, and sample identification.
- The GC recorder output was marked with the date, the run number, and the well boring number and was saved for future reference.
- Results were checked for quality assurance/quality control in RMT's Madison office by comparing the tabulated results with the original chromatogram.
- Limits of Detection (LOD) were calculated from the detector response (in PPB-V/V-sec), the minimum area recorded by the GC (100 mV-sec), and the injection volume as follows.

$$\text{LOD, PPB} = (\text{response to standard, } \frac{\text{PPB-V}}{\text{V-sec}})(0.100 \text{ V-sec})\ \frac{\text{std. inj. vol. uL}}{\text{(sample inj. vol. uL)}}$$

APPENDIX E

PILOT TESTS AND OPERATIONAL LOGS

SOIL VAPOR EXTRACTION SYSTEM
OPERATIONS LOG

CCP-SAUKVILLE

File:SVECCP.WK1
Author:PJG
Revision:org

PROJECT NUMBER: 1832.42

		-- SYSTEM DATA --				-- OFF-GAS ANALYSIS --				-- CALCULATED DATA --				-- CUMULATIVE RECOVERY --	
Sample Date	Time	W'head Vacuum (in w.c.)	System Vacuum (in w.c.)	Diff. Press. (in w.c)	W'head Temp. (deg F)	Benzene (lb/cf)	Ethyl-Benzene (lb/cf)	Toluene (lb/cf)	Total Xylenes (lb/cf)	Cum'tive Run Time (hrs)	Airflow (cfm)	Total VOC Em'sion Rate (lb/hr)	Benzene Em'sion Rate (lb/hr)	Total VOC's (lbs)	Benzene (lbs)
VE-1															
15-Jun-93	09:30 AM	42	42	0.60	58					0.00	45				
15-Jun-93	10:00 AM	40	40	0.59	59		7.9E-06	6.1E-06	3.7E-05	0.50	44	1.4E-01			
15-Jun-93	10:30 AM	37	37	0.60	59		9.6E-06	8.3E-06	4.1E-05	1.00	45	1.6E-01			
15-Jun-93	11:00 AM	36	36	0.66	59		9.2E-06	7.7E-06	4.0E-05	1.50	47	1.6E-01			
15-Jun-93	11:30 AM	36	36	0.60	59		7.3E-06	5.1E-06	3.4E-05	2.00	44	1.2E-01			
15-Jun-93	12:00 PM	21	21	0.51	59		5.9E-06	4.6E-06	2.8E-05	2.50	40	9.3E-02			
15-Jun-93	12:15 PM	21	21	0.50	59					2.75	40				
15-Jun-93	12:25 PM	21	21	0.50	59		7.3E-06	5.4E-06	3.3E-05	2.92	40	1.1E-01			
VE-2															
15-Jun-93	12:30 PM	21	21	0.36	59					0.00	34				
15-Jun-93	01:00 PM	24	24	0.33	59	2.0E-07	1.6E-05	1.2E-05	6.2E-05	0.50	32	1.8E-01	3.9E-04		
15-Jun-93	01:30 PM	24	24	0.34	59	2.3E-07	1.8E-05	1.4E-05	6.9E-05	1.00	33	2.0E-01	4.5E-04		
15-Jun-93	02:00 PM	24	24	0.34	59	2.4E-07	1.9E-05	1.3E-05	7.0E-05	1.50	33	2.0E-01	4.7E-04		
15-Jun-93	02:30 PM	36	36	0.68	59	2.8E-07	2.2E-05	1.5E-05	7.7E-05	2.00	47	3.2E-01	8.0E-04		
15-Jun-93	03:00 PM	35	35	0.58	59	2.7E-07	2.1E-05	1.5E-05	7.8E-05	2.50	44	3.0E-01	7.1E-04		
15-Jun-93	03:30 PM	35	35	0.50	59	2.2E-07	1.8E-05	1.2E-05	6.4E-05	3.00	41	2.3E-01	5.4E-04		

APPENDIX F

ANALYTICAL RESULTS

PORTABLE GC RESULTS SUMMARY

6/15/93 Project Name: CCP SAUKVILLE PROJ. #1832.42

Note: All Units in lbs/ft^3

Sample ID	Benzene	Toluene	Ethyl-benzene	Total Xylene	Total
SVE1 10:00		6.1 E-6	7.9 E-6	3.7 E-5	5.1 E-5
" 10:30		8.3 E-6	9.6 E-6	4.1 E-5	5.9 E-5
" 11:00		7.7 E-6	9.2 E-6	4.0 E-5	5.7 E-5
" 11:30		5.1 E-6	7.3 E-6	3.4 E-5	4.6 E-5
" 12:00		4.6 E-6	5.9 E-6	2.8 E-5	3.9 E-5*
" 12:00		5.4 E-6	7.3 E-6	3.3 E-5	4.6 E-5
*GC FLOW-PRESSURE ADJUSTED					
SVE2 13:00	2.0 E-7	1.2 E-5	1.6 E-5	6.2 E-5	9.0 E-5
" 13:30	2.3 E-7	1.4 E-5	1.8 E-5	6.9 E-5	1.0 E-4
" 14:00	2.4 E-7	1.3 E-5	1.9 E-5	7.0 E-5	1.0 E-4
" 14:30	2.8 E-7	1.5 E-5	2.2 5-5	7.7 E-5	1.1 E-4
" 15:00	2.7 E-7	1.5 E-5	2.1 E-5	7.8 E-5	1.1 E-4
" 15:30	2.2 E-7	1.2 E-5	1.8 E-5	6.4 E-5	9.4 E-5

Notes:

BD = Below detection (using maximum sensitivity of operation conditions described in sampling procedures).

ND = Nondetect (no concentration detected for operation conditions less than maximum sensitivity).

APPENDIX C

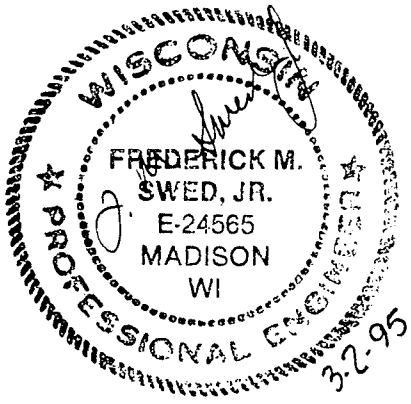
BID PACKAGE FOR CONSTRUCTION OF A SOIL REMEDIATION SYSTEM (MAR(

BID PACKAGE
FOR
CONSTRUCTION OF A SOIL REMEDIATION SYSTEM

PREPARED FOR
COOK COMPOSITES & POLYMERS COMPANY
SAUKVILLE, WISCONSIN

PREPARED BY
RMT, INC.
MADISON, WISCONSIN

MARCH 1995



Frederick M. Swed, Jr., P.E.
Department Manager, Process Design

Leo H. Tramm
Project Engineer

James S. Rickun
Vice President, Northern Region/
Air Program Manager

This Bid Package is accompanied by a set of drawings of the same title. The documents are interrelated and are intended to be used together.

RMT, INC. — MADISON, WI
744 HEARTLAND TRAIL - 53717-1934
P.O. BOX 8923 - 53708-8923
608/831-4444 - 608/831-3334 FAX

TABLE OF CONTENTS

INVITATION TO BID
CONSTRUCTION OF A SOIL VAPOR EXTRACTION SYSTEM
COOK COMPOSITE & POLYMER COMPANY
SAUKVILLE, WISCONSIN

You are invited to bid on the construction of a soil vapor extraction (SVE) System for the treatment of volatile organic compound (VOC) contaminated soils at Cook Composite & Polymers Company (hereinafter referred to as the OWNER) at the OWNER's Saukville facility located at 340 Railroad Street, Saukville, Wisconsin, 53080. The Work will include the following:

Pumps and Piping

Furnish materials, labor, and equipment to install well pumps and piping from four existing extraction/ recovery wells to a new equipment enclosure including: vapor-phase, liquid-phase, and electrical piping. Includes finishing of the well heads, backfilling and compacting of the trenches, interconnecting piping within the equipment enclosure, and repaving of the site as required.

Soil Vapor Extraction System

Furnish one skid-mounted 200 cfm vapor extraction system capable of an inlet vacuum of 5 inches Hg. Include associated vacuum blower, motor, motor starter, vacuum gauges, differential pressure gauges, flow sensors, temperature indicator, silencer, inlet filter, pressure and vacuum relief valves, moisture separator tank, well pumps, and transfer pump.

Controls

Furnish a control panel (to be mounted remotely) for the SVE system to operate the well pumps, the vacuum blower, and the transfer pump. Include main disconnect with door interlock, "hand-off-automatic" selector switches, motor starters with thermal overload protection; control transformer; status indicator lights; reset buttons and other requirements stated in the specifications.

Equipment Housing

Furnish one pre-fabricated metal equipment enclosure to house SVE system and related components. The enclosure shall be mounted on a concrete pad installed by the Contractor prior to arrival of the equipment enclosure. Building shall include provisions for lighting, heating, and ventilating.

Work shall begin by May 1, 1995, and shall be substantially complete by June 30, 1995, or the project is to be completed within 90 calendar days from the date of award.

Sealed Lump Sum bids will be received by Mr. Eric Naimark at the office of the OWNER at the above address until 5:00 p.m. on March 31, 1995.

Any bids received after that time shall remain unopened.

The OWNER reserves the right to waive any irregularities and to reject any or all bids.

A Pre-Bid Conference will be held on March 22, 1995, at 10:00 a.m. at the office of the OWNER. Attendance is mandatory.

BID FORM
LUMP SUM PRICE

Project: Cook Composite & Polymers Co. - Saukville, Wisconsin (1832.88)

Bid From: _____

_____

Item[1]	Contractor's Labor and Equipment	Purchased Materials and Equipment	Subcontractors	Subtotals[1]
1. Trenching, Piping, Backfilling, Compacting, and Paving				
2. Site Improvements (Section 02801) (including building and new electrical service)				
3. Well Pumps (Section 11210)				
4. Control Panel (Section 16010)				
5. Soil Vapor Extraction System (Section 15851)				
			LUMP SUMP PROJECT TOTAL	

NOTES:

[1] Line items and subtotal amounts are for bid evaluation purposes only.

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with ENGINEER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

(a) BIDDER has examined copies of all the Bidding Documents and all Addenda, receipt of which is hereby acknowledged.

(b) BIDDER has visited the site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, performance, and furnishing of the Work;

(c) BIDDER is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, performance, and furnishing of the Work;

(d) BIDDER acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the site.

(e) BIDDER is aware of the general nature of Work to be performed by OWNER and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.

(f) BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that BIDDER has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

(g) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; BIDDER has not directly or indirectly induced or solicited any other BIDDER to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm, or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other BIDDER or over OWNER.

3. BIDDER accepts the provisions of the Agreement as to Liquidated Damages in the event of failure to complete the Work within the times specified in the Agreement.

_____

(Signature of Bidder's Authorized Representative)

_____

(Name and Title of Bidder's Authorized Representative)

_____

(Date of Bid)

SECTION 01007
GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Type of Contract.

B. Notices.

C. Permits.

D. Taxes.

E. Health and Safety.

F. CONTRACTOR Use of Premises.

G. Monitoring and Vacuum Well Protection.

H. Submittals.

I. Coordination.

J. General Equipment Design, Fabrication, and Shipping.

K. Substitutions.

L. Quality Control and Workmanship.

M. Reference Standards.

N. CONTRACTOR Startup Services.

O. Definitions, Acronyms, and Abbreviations.

P. Contract Closeout Procedures.

1.02 TYPE OF CONTRACT

A. Work shall be performed on a lump sum basis. Lump sum amounts shall be full compensation for all labor, materials, equipment, and services necessary for completion of the Work as described in the Drawings and Specifications.

1.03 NOTICES

A. Give all notices; observe and comply with all laws, rules, regulations, and ordinances applicable to the Work.

B. Notify area utility companies before beginning Work in accordance with state and local regulations.

C. Provide timely notification to all inspectors from governmental agencies and other authorities with permitting or other jurisdictional authority pertaining to the Work.

1.04 PERMITS

A. Obtain and pay for all construction permits and licenses for Work under relevant trades.

B. Pay all governmental charges and inspection fees necessary for execution of the Work, which are applicable at the time of CONTRACTOR's Bid.

1.05 TAXES

A. Pay all sales, consumer, use, and other similar taxes required to be paid in accordance with the law of the place where the Work is to be performed.

1.06 HEALTH AND SAFETY

A. Rigorously abide by all regulations concerning Health and Safety. When required, CONTRACTOR shall develop a site-specific Health and Safety Plan to cover all workers on the site. CONTRACTOR is responsible for implementing the Health and Safety Plan, directing the training of personnel, and for providing safety equipment and incidentals as required. The Health and Safety Plan shall incorporate the Standard Operating Safety Guidelines published by the United States Environmental Protection Agency (November 1984) where applicable and requirements specified in OSHA Standard 1910.120. The Health and Safety Plan shall comply with all applicable federal, state, and local requirements.

B. OWNER's Requirements: CONTRACTOR will be required to identify a safety coordinator, sign a site entry document, view OWNER's safety video at the outset of the Work, wear hard hats, safety glasses, and steel-toe boots, and be visually identifiable. There will be a general work permit issued at the outset of the job, followed by any necessary excavation or hot work permits. CONTRACTOR shall coordinate daily with the plant staff. It may also be necessary to coordinate on-site construction activities with the OWNER's annual open house in the spring.

1.07 CONTRACTOR USE OF PREMISES

A. Limit use of premises for Work and for construction operations.

B. Coordinate access to site with OWNER's requirements.

C. OWNER will occupy premises during entire period of construction for the conduct of normal operations. Coordinate with OWNER to minimize conflict and to facilitate OWNER's operations.

D. OWNER will provide approximate utility locations on OWNER's property. Locate, identify, and protect existing utilities and structures from damage.

1.08 MONITORING AND VACUUM WELL PROTECTION

A. Preserve and protect from damage existing monitoring and vacuum wells.

B. Notify ENGINEER of necessary alterations or damage to monitoring or vacuum wells.

C. Repair any well damaged by CONTRACTOR's operations by excavating to below the broken casing, extending PVC to previous elevation, and replacing protective casing and top seal, as required by ENGINEER. No PVC cement shall be used.

1.09 SUBMITTALS

A. Submit product data and shop drawings of equipment to ENGINEER for acceptance.

B. Present in a clear and thorough manner. Title each drawing with Project Name. Identify each element of drawings by reference to sheet number and detail of Contract Documents.

C. Identify field dimensions. Show relationship to adjacent or critical features of Work or products.

D. Submit the number of opaque reproductions required by CONTRACTOR, plus two copies which will be retained by ENGINEER. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.

E. Notify ENGINEER in writing at the time of submittal of any deviations from requirements of Contract Documents.

F. Do not fabricate products or begin work which requires submittals until return of submittal with ENGINEER's acceptance.

1.10 COORDINATION

A. Notify ENGINEER a minimum of 5 working days prior to start of equipment installation.

B. Coordinate installation and startup activities with ENGINEER's Site Representative.

1.11 GENERAL EQUIPMENT DESIGN, FABRICATION, AND SHIPPING

A. Provide components of the same manufacturer, for interchangeable components.

B. Fabricate required equipment at CONTRACTOR's or equipment manufacturer's shop.

C. For all skid-mounted systems, provide all structural steel supports and lifting lugs necessary for unloading, erection, and operation. Provide checkered steel plate over top of each structural steel skid to facilitate operation and maintenance by OWNER.

D. Design all skids with sufficient space to allow easy access to all components for routine maintenance and for easy disassembly, removal, and replacement of all components.

E. CONTRACTOR shall adequately prepare all equipment for shipment. Where required by the nature of the equipment, CONTRACTOR shall furnish and install necessary covers to protect equipment from rain, snow, hail, wind, dust, sunlight, and other potentially harmful elements. Equipment shall be adequately sealed and protected during shipment to prevent corrosion, entrance of foreign matter, and possible damage from rough handling during transit. Any articles or materials that might otherwise be lost in shipping shall be boxed and plainly identified.

F. CONTRACTOR shall provide written notification to ENGINEER and OWNER at least 7 days in advance of the expected shipping date.

1.12 SUBSTITUTIONS

A. ENGINEER will consider CONTRACTOR's request for substitutions only within 15 days after Award of Contract. Subsequently, substitutions will be considered only when a product becomes unavailable through no fault of CONTRACTOR.

B. Document each request with complete data substantiating compliance of proposed substitutions with Contract Documents.

C. Requests for substitutions constitute a representation that CONTRACTOR:

1. Has investigated the proposed product and determined that it meets or exceeds, in all respects, the specified product.

2. Shall provide the same warranty for substitution as for the specified product.

3. Shall coordinate installation and make other changes which may be required for Work to be complete in all respects.

4. Waives claims for additional costs which may become apparent to CONTRACTOR subsequent to ENGINEER's receipt of written request for substitution.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision to Contract Documents, as determined by ENGINEER.

E. ENGINEER will determine acceptability of proposed substitutions, and will notify CONTRACTOR of acceptance or rejection in writing within 15 calendar days after ENGINEER's receipt of written request for substitution.

F. Only one request for substitution will be considered for each product. When substitution is not accepted, provide product as specified.

1.13 QUALITY CONTROL AND WORKMANSHIP

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce Work of specified quality.

B. Comply with industry standards except when more restrictive tolerances or requirements are specified.

C. Perform Work by persons trained and qualified to produce workmanship of specified quality.

D. Equipment Warranties: CONTRACTOR shall warrant that all equipment is free from defects in materials and workmanship, and will meet the design requirements and perform acceptably in this service when operating for a minimum of 1 year from the Date of Substantial Completion of the Work. CONTRACTOR's equipment warranty shall include repair, or replacement at CONTRACTOR's option, of any item not meeting its warranty, at no cost to OWNER or ENGINEER.

1.14 REFERENCE STANDARDS

A. Where published standards or specifications of a government agency, technical association, trade association, professional society or institute, testing agency, or other organization are referenced in the Specifications, the date of the standard or specification to be used is that in effect as of the effective date of the Contract, except when a publication date or edition is specified.

1.15 CONTRACTOR STARTUP SERVICES

A. Provide the services of a competent startup and operating representative to provide the following on-site services.

1. Inspect all installed systems to verify proper installation and make final adjustments of equipment and instrumentation prior to startup.

2. After inspections and final adjustments have been made, certify in writing that the system is ready for initial startup and operation.

3. Assist ENGINEER's Site Representative and OWNER's designated operating personnel in initial startup debugging and placing all installed systems into successful service.

4. During initial startup, train OWNER's designated operating personnel in procedures for routine operation and maintenance of all installed systems.

B. CONTRACTOR's representative shall be capable and experienced in providing on-site startup and operating assistance services and training for systems similar in size and complexity to that being furnished by CONTRACTOR.

C. CONTRACTOR's representative shall be vested by CONTRACTOR with the authority to make decisions binding on CONTRACTOR.

1.16 DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

A. Definitions:

1. Provide: Means to furnish and install in place.

2. Days: Consecutive calendar days of 24 hours each.

3. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components required for reuse.

4. As indicated: Means as shown, listed, or described on the Contract Drawings.

B. Acronyms:

ACI:	American Concrete Institute
AGA:	American Gas Association
ANSI:	American National Standards Institute
ASME:	American Society of Mechanical Engineers
ASTM:	American Society for Testing and Materials
ICEA:	Insulated Cable Engineers Association
IEEE:	Institute of Electrical and Electronics Engineers, Inc.
ISA:	Instrument Society of America
JIC:	Joint Industrial Council
UL:	Underwriters' Laboratories
NEC:	National Electrical Code
NECA:	National Electrical Contractors' Association, Inc.
NEMA:	National Electrical Manufacturers' Association
NFPA:	National Fire Protection Association
OSHA:	Occupational Safety and Health Administration
SSPC:	Steel Structures Painting Council
TEMA	Tubular Equipment Manufacturers Association
UBC:	Uniform Building Code
UL:	Underwriters Laboratory

C. Abbreviations:

AC:	Alternating Current
acfm:	Actual cubic feet per minute
AWG:	American Wire Gauge
CPVC:	Chlorinated Poly Vinyl Chloride
DC:	Direct Current
FM	Factory Mutual
FVNR:	Full-Voltage, Non-Reversing
gpm:	Gallons per minute
HDPE:	High-Density Polyethylene
Hp:	Horsepower
HVAC:	Heating, Ventilating, and Air Conditioning
Hz:	Hertz
IRI	Industrial Risk Insurers
NPSH:	Net Positive Suction Head
PLC:	Programmable Logic Controller
psig:	Pounds per square inch-gauge pressure
PVC:	Poly Vinyl Chloride
rpm:	Revolutions per minute

scfm:	Standard cubic feet per minute
TDH:	Total Dynamic Head
TEFC:	Totally Enclosed, Fan-Cooled
VAC:	Volts - Alternating Current
VOC:	Volatile Organic Compound

1.17 CONTRACT CLOSEOUT PROCEDURES

A. Substantial Completion

1. When CONTRACTOR considers Work is substantially complete, submit written notice to ENGINEER with list of items to be completed or corrected.

2. Should ENGINEER's inspection find Work is not substantially complete, ENGINEER will promptly notify CONTRACTOR in writing, listing observed deficiencies.

3. CONTRACTOR shall remedy deficiencies and subsequently send a written notice of substantial completion to ENGINEER.

4. When ENGINEER determines that Work is substantially complete, ENGINEER will prepare and send a Certificate of Substantial Completion to CONTRACTOR.

B. Final Completion

1. When CONTRACTOR considers Work is complete, submit written certification of the following items to ENGINEER:

   a. Contract Documents have been reviewed.

   b. Work has been inspected for compliance with Contract Documents.

   c. Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.

   d. Equipment and systems have been tested and are fully operational.

   e. Operation of systems has been demonstrated to ENGINEER's and OWNER's personnel.

   f. Work is complete and ready for final inspection.

2. Should ENGINEER's inspection find Work incomplete, ENGINEER will promptly notify CONTRACTOR in writing listing observed deficiencies.

3. CONTRACTOR shall remedy deficiencies and subsequently send a certification of final completion.

4. ENGINEER will consider Closeout Submittals when ENGINEER determines that Work is complete.

C. Closeout Submittals

1. Certificates of Inspection required for mechanical and electrical systems.

2. Warranties.

3. Equipment manufacturers' operation and maintenance data.

4. Evidence of payment and release of liens, in accordance with Terms and Conditions of the Contract.

D. Application for Final Payment - Submit application for final payment in accordance with Terms and Conditions of the Contract.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 02221
TRENCHING, BACKFILLING, AND COMPACTING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Excavating trenches, backfilling, and compacting for installation of piped utilities.

B. Dewatering, protection and maintenance of trench, support of existing structures, sheeting and shoring, and containerizing excess excavated materials and fill.

1.02 REFERENCES

A. OSHA 29 CFR Part 1926, Occupational Safety and Health Standards - Excavations.

PART 2 PRODUCTS

2.01 BACKFILL MATERIALS

A. Backfill: General Fill consisting of materials free from organic matter, masonry, metal, sharp objectives, boulders, snow and ice. No solid material larger than 6 inches in its largest dimension.

2.02 BEDDING MATERIALS

A. For all pipes greater than 10 inches in diameter: Washed gravel or crushed stone meeting the following gradation:

Passing 1" sieve	100%
Passing 1/2" sieve	35-65%
Passing #200 sieve	0-10%

B. For all pipes less than 10 inches in diameter:

Sieve Size	Percent Passing
3/8 inch	100
No. 4	95 - 100
No. 8	70 - 100
No. 16	38 - 80
No. 30	18 - 60
No. 50	5 - 30
No. 100	1 - 10
No. 200	0 - 5

PART 3 EXECUTION

3.01 PREPARATION AND RESTORATION

A. Remove sod, topsoil, and other surface treatment and restore to original condition or better upon completion of the Work.

3.02 PROTECTION

A. Protect excavations by shoring, bracing, sheet piling, or other methods required to prevent cave-in or loose soil from falling into excavation.

B. Place excavated and other material 2-feet minimum back from edge of trench excavation.

C. Minimum trench excavation slope to be 1.5:1.

D. Underpin adjacent structures which may be damaged by excavation Work, including utilities and piping.

E. Notify Resident Project Representative (RPR) immediately of unexpected subsurface conditions.

F. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.

3.03 TRENCHING

A. Excavate to the required alignment and grade. Elevations of pipes subject to revisions as necessary to fit field conditions.

B. No adjustment in compensation will be made for grade adjustments not in excess of one foot above or below the plan elevations.

C. Maximum trench width at pipe level to be outside pipe diameter plus 24 inches.

D. Remove water which may accumulate in trench, and construct ditches, flumes, and dams to direct water away from excavation.

E. RPR may limit the amount of open trench where field conditions or plant operations require.

F. RPR may order additional excavation where unsuitable soil conditions are encountered.

G. Promptly store excess excavation material in Wisconsin DOT-approved 55-gallon barrels for disposal by OWNER.

3.04 UTILITY TEST HOLES

A. Where potential utility conflicts are anticipated, uncover utility lines well in advance of trench excavation.

B. Determine grade of the utility line. RPR will advise the Utility Company of the adjustment required.

C. Backfill and restore disturbed area to original condition.

3.05 BEDDING

A. Minimum bedding requirements: Install bedding material from 6 inches below pipe to 12 inches above pipe.

B. Minimum depth of pipe embedment in bedding: One third outside pipe diameter.

C. Mechanically compact bedding.

3.06 BACKFILLING

A. Backfill immediately following completion of pipe installation.

B. Take necessary precautions with backfill and construction operations to protect completed utility system from damage.

C. Backfill with care around structures and cleanouts.

D. Backfill to the original ground elevation unless shown otherwise on Drawings.

3.07 COMPACTING

A. Compact backfills to at least 90 percent of the maximum dry density.

END OF SECTION

SECTION 02510
ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDES

A. Asphaltic concrete paving, including subgrade preparation, base and surface courses.

1.02 REFERENCES

A. The Asphalt Institute - Manual MS-4 - The Asphalt Handbook.

B. The Asphalt Institute - Manual MS-13 - Asphalt Surface Treatments and Asphalt Penetration Macadam.

C. ASTM D946 - Asphalt Cement for Use in Pavement Construction.

D. State of Wisconsin Department of Transportation, 1989 Standard Specifications for Road and Bridge Construction.

E. ASTM D698 - Standard Test Methods for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures using 5.516 Rammer and 12-inch Drop: Standard Proctor.

1.03 QUALITY ASSURANCE

A. Perform Work in accordance with State of Wisconsin, Department of Transportation, 1989 Standard Specifications for Road and Bridge Construction, Section 407, Asphaltic Concrete Pavement.

PART 2 PRODUCTS

2.01 MATERIALS

A. Crushed stone base course: Wisconsin DOT Gradation No. 2, 6 inches thick.

B. Bituminous material: Asphalt, Type AC with a grade designation of 85-100, 3-inches thick.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 PREPARATION

A. Neatly sawcut the full depth of existing pavement.

B. Keep edges of existing pavement free of loose stones or pavement pieces.

3.03 CRUSHED STONE BASE COURSE

A. Place crushed stone in two lifts.

B. Mechanically compact lower lift prior to placing upper lift.

3.04 ASPHALTIC MATERIAL

A. Lay asphalt in two lifts.

B. Match existing pavement grades or grades indicated by the OWNER.

END OF SECTION

SECTION 02801
SITE IMPROVEMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Building Requirements

B. Electrical Requirements

PART 2 PRODUCTS

2.01 BUILDING REQUIREMENTS

A. Service

1. Preassembled steel structure to enclose a SVE system. SVE system shall be skid mounted and positioned in one corner of the building. External piping, used to convey recovered groundwater and vapors from the recovery wells, shall enter the building through the foundation and shall be combined into header pipes leading to the SVE system and to a sanitary manhole.

2. All equipment located within the structure, including heating and lighting systems, shall be suitable for hazardous locations and rated for Class 1, Group D, Division 2.

B. Interior Dimensions - Building interior dimensions shall be approximately 7 feet wide by 11 feet long and 8 feet high.

C. Materials of Construction

1. Fourteen gauge, 3 inch channel for base, posts, girts, eave struts, trusses, purlins, bracing, and connecting plates. Twenty-six gauge ribbed panel for exterior walls and roof. 24 gauge liner panel on interior to conceal fasteners.

2. Building door shall be of 18 gauge steel 6 feet wide by 7 feet high. Door fame to be 16 gauge with steel NRP hinges, weather stripping threshold, sweep, watershed, appropriate warning signs, and crash chain. Provide commercial/industrial quality lockest with minimum two sets of keys.

3. Insulate building walls to R-14 and building roof/ceiling to R-21 using fiberglass blanket insulation.

D. Exterior Finish - Siliconized polyester paint finish in color to match OWNERS existing structure located immediately east of this new structure. Finished paint coats shall have a combined coating thickness of 0.8 to 1.2 mils of dry film thickness.

E. Interior Finish - Siliconized polyester paint finish in regal/bright white. Finished paint coats shall have a combined coating thickness of 0.8 to 1.2 mils of dry film thickness.

F. Roofing - Gable with 2:12 pitch, 26 gauge ribbed panel.

G. Foundation

1. Surface to be prepared using 12 inches (minimum) of 3/4 inch compacted concrete aggregate.

2. Building shall be place on a reinforced concrete pad approximately 96 inches wide by 144 inches long and 6 inches (minimum) thick, or to match outside dimensions of building. Provide concrete ramp/apron to front door.

3. Building shall be fabricated on 4 inches by 4 inches perimeter angle to incorporate horizontal fastening to foundation.

H. Heating - Provide electric heater and thermostat sufficient to maintain a minimum temperature of 40° during all seasons of the year.

I. Ventilation - Provide an exhaust fan, intake fan, and fan thermostat to assist in maintaining the indoor temperature below 80° Fahrenheit during summer months and to provide a minimum of 1 air change per minute.

J. Lighting - Provide a ceiling mounted light fixture and wall mounted switch sufficient to maintain a minimum indoor illumination of 75 footcandles.

K. Acceptable Manufacturers:

S.B. Systems, Inc.
P.O. Box 472266
Tulsa, Oklahoma 74147-2266
(918) 627-8055

Trachte Manufacturing Corporation
422 North Burr Oak Avenue
Oregon, Wisconsin 53575
(608) 835-5707

2.02 ELECTRICAL REQUIREMENTS

A. Contractor shall route electrical service overhead from existing plant supply at Building 7. Provide sub-meter, panel board, and related wiring to accommodate the following building utilities:

- Outlets
- Interior lighting
- Electrical Heater
- Exhaust Fan

and the following system related devices:

Motor	Horsepower	Voltage	Phase
Well Pump: VE-1	1/3	230	1
Well Pump: VE-2	1/3	230	1
Well Pump: VE-3	1/3	230	1
Well Pump: VE-4	1/3	230	1
Vacuum Blower	5	230	3
Transfer Pump	1 (est.)	230	3

B. Contractor shall contact local utility company and OWNER for exact service configuration.

C. Main panel board shall be located on an exterior wall.

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 11210
WELL PUMPS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish and install well pumps, motors, level sensors, flow meters, according to the attached pump data sheets. Include pitless adaptor for existing well casing.

1.02 REFERENCES

A. NFPA-70 - National Electrical Code.

1.03 SUBSTITUTIONS

A. Under provisions of Section 01007.

1.04 SUBMITTALS

A. Submit manufacturer's product data and information to ENGINEER for approval, for each of the following: pumps; flow meters; level sensors.

PART 2 PRODUCTS

2.01 PUMPS (SUBMERSIBLE)

A. Submersible type, stainless-steel construction.

B. Teflon seals and bearings.

C. Integral stainless-steel check valve and inlet screen.

D. Acceptable Manufacturer: Goulds Pump, Inc.
Seneca Falls, NY 13148

2.02 MOTOR

A. Compatible with pump specified for continuous, submerged use.

B. Total enclosed, stainless steel housing.

C. Stainless steel coupling and shaft

D. Full voltage starting.

E. Include continuous teflon-coated motor leads to surface. No splices shall be allowed.

F. Acceptable Manufacturer: Franklin Electric
Bluffton, IN 46714

2.03 LEVEL SENSORS AND RELAYS FOR CONDUCTIVE LIQUIDS

A. Sensor: Provide an induction type level sensing system with stainless-steel Type E-1S shielded wire suspension electrodes and Type SW suspension wire, capable of supporting electrodes.

B. Relay: Provide an induction relay with field convertible contacts. Relay shall provide an intrinsically safe operation when used with level sensor.

C. Miscellaneous hardware: Provide all required hardware as recommended by the manufacturer. All hardware shall be Type 316 stainless steel.

D. Acceptable Manufacturer: B/W Controls (Magnetek)
1080 North Crooks Road
Clawson, MI 48017

2.04 FLOW METERS

A. Manifold: Turbine type, thermoplastic rotor, bronze housing. Wells: Disc type, bronze housing.

B. ± 1.50 percent accuracy over a flow range of 0 to 8 gpm for the manifold, and 1 to 2 gpm for the individual wells. Maximum design temperature 130°F, maximum design pressure 150 psig. Nine-digit totalizer.

C. Acceptable Manufacturer: Badger Meter, Inc.
4545 West Brown Deer Road
Milwaukee, WI 53223

2.05 PITLESS ADAPTOR

A. Type and Model: Clamp-on with 304 stainless steel nipple and bronze casting type in the water discharge line. Cast steel housing clamped to outside of well. MAASS Model JC or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install pumps, motors, level sensors in accordance with manufacturers' recommendations.

B. Install pump and riser piping such that motor leads and level sensors are free from entanglement.

3.02 STARTUP AND TESTING

A. Coordinate startup activities with ENGINEER's Site Representative.

B. Test and place in working order all equipment and instrumentation. Verify that each piece of equipment has been checked for proper lubrication, drive rotation, or other conditions which may cause damage.

C. Verify that tests, meter readings, and specified electrical characteristics agree with those required by equipment manufacturers.

D. Verify that wiring and support components for equipment are complete and tested.

E. Demonstrate that pumps are capable of delivering the required flow rate at the specified head.

END OF SECTION
(WITH ATTACHED DATA SHEETS)

Liquid Pumped		Groundwater
Performance Requirements		
Capacity, gpm		1.0 - 2.0
Head (TDH), feet		20
Minimum Efficiency, percent		65
Speed, Nominal, rpm		3,450
Service Conditions		
pH Range, standard units		6 - 9
Erosion		Non-Abrasive
Temperature, Nominal, °F		40
Viscosity, centistokes		1
Cleaning Compounds		Chlorine
Well Diameter, Nominal, inch		4 or 6
Construction Materials		
Bowls		Stainless Steel
Bowl Shaft		Stainless Steel
Impellar		Stainless Steel
Seals		Teflon
Motor		
Phase		1
Voltage		240
Horsepower, Nominal		1/3
Well Pump Data Sheet	Sheet No: 11210-6	Equipment No(s): P-101, P-102, P-103, F-104
	Job No: 1832.88	Revision No: 0

SECTION 15060
PROCESS PIPING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide and install piping and fittings for the following process applications: vacuum air, water-pressure, water-gravity drain, airline.

1.02 REFERENCES

A. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

B. ANSI B16.3 - Malleable Iron Threaded Fittings.

C. ANSI B16.4 - Cast Iron Threaded Fittings Class 125 and 250.

D. ANSI B16.18 - Cast Bronze Solder-Joint Pressure Fittings.

E. ANSI B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings.

F. ANSI B31.1 - Power Piping.

G. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

H. ASTM A105 - Specification for Forgings, Carbon Steel, for Piping Components.

I. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses.

J. ASTM A181 - Specification for Forgings, Carbon Steel for General Purpose Piping.

K. ASTM A197 - Specification for Cupola Malleable Iron

L. ASTM A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

M. ASTM B32 - Solder Metal.

N. ASTM B88 - Seamless Copper Water Tube.

O. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated PVC Compounds.

P. ASTM D1785 - PVC Plastic Pipe, Schedules 40, 80, and 120.

Q. ASTM D2464 - Standard Specification for Threaded PVC Plastic Pipe Fittings, Schedule 80.

R. ASTM D2466 - PVC Plastic Pipe Fittings, Schedule 40.

S. ASTM D2564 - Solvent Cements for PVC Plastic Pipe and Fittings.

T. ASTM D2683 - Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe.

U. ASTM D2855 - Making Solvent-Cemented Joints with PVC Pipe and Fittings.

V. ASTM D3035 - Polyethylene Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.

W. ASTM D3350 - Polyethylene Plastics Pipe and Fittings Material.

X. AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.

Y. NCPWB - Procedure Specifications for Pipe Welding.

Z. NFPA 54 - National Fuel Gas Code.

1.03 SUBMITTALS

A. Under provisions of Section 01007.

B. Provide product data for pipe materials.

1.04 QUALITY ASSURANCE

A. Order all pipe with each length marked with type, size, and pressure rating.

B. Use only new material, free of defects, rust and scale.

1.05 WELDER QUALIFICATIONS

A. Welding procedures, welders, and welding operators for all building service piping shall be in accordance with certified welding procedures of the National Certified Pipe Welding Bureau and Section 927.5 of ASME B31.9 Building Services Piping or AWS 10.9 Qualification of Welding Procedures and Welders for Piping and Tubing.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Promptly inspect shipments to ensure that the material is undamaged and complies with specifications.

B. Cover pipe to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, aboveground packaging.

C. Off-site storage agreements will not relieve the contractor from using proper storage techniques.

D. Storage and protection methods must allow inspection to verify products.

PART 2 PRODUCTS

2.01 GALVANIZED STEEL PIPE FOR GRAVITY DISCHARGE AND AIRLINE

A. Pipe: ASTM A53 or A120, Schedule 40.

B. Fittings: Malleable iron, threaded, 150 pounds, ASTM A197.

C. Joints: Threaded.

2.02 PVC PLASTIC PIPING FOR VACUUM SERVICE

A. PVC Material: ASTM D1784.

B. Pipe: ASTM D1785, Schedule 40.

C. Fittings: ASTM D2466, Schedule 40, socket type.

D. Joints: ASTM D2855, solvent welded. ASTM D2564 heavy body solvent cement.

2.03 PVC PLASTIC PIPING FOR PRESSURE SERVICE (WATER)

A. PVC Material: ASTM D1784.

B. Pipe: ASTM D1785, Schedule 80.

C. Fittings: ASTM D2464, Schedule 80, socket-type.

D. Joints: ASTM D2855, solvent welded. ASTM D2564, heavy body solvent cement.

2.04 UNIONS AND FLANGES

A. General: Unions, flanges and gasket materials to have a pressure rating of not less than 150 psig at 180 degrees.

B. Two Inch and Smaller Steel: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron on black steel piping and galvanized malleable iron on galvanized steel piping.

C. Two Inch and Smaller Copper: ANSI B16.18 cast bronze union coupling or ANSI B15.24 Class 150 cast bronze flanges.

D. Two 1/2 Inch and Larger Steel: ASTM A181 or A105, Grade 1 hot forged steel flanges of threaded, welding neck, or slip-on pattern on black steel and threaded only on galvanized steel. Use raised face flanges ANSI B16.5 for mating with other raised face flanges or equipment with flat ring or full face gaskets. Use ANSI B16.1 flat face flanges with full face gaskets for mating with other flat face flanges on equipment.

E. Two 1/2 Inch and Larger Copper: ANSI B15.24 Class 150 cast bronze flanges with full face gaskets.

PART 3 EXECUTION

3.01 GENERAL

A. Install pipe and fittings in accordance with reference standards, manufacturers recommendations and recognized industry practices.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient.

D. Install piping to conserve building space and not interfere with use of space. Make all pipe runs parallel or perpendicular (90°) to walls, floors, and ceilings.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not exposed.

I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

J. Provide support for utility meters in accordance with requirements of utility companies.

3.04 PIPE HANGERS AND SUPPORT

A. Support horizontal piping as scheduled.

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place hangers within 12 inches of each horizontal elbow.

Pipe Size (inches)	Maximum Hanger Spacing (feet)	Hanger Rod Diameter (inches)
Steel:		
1/2 to 1 1/4	6.5	3/8
1 1/2 to 2	10	3/8
2 1/2 to 3	10	1/2
4 to 6	10	5/8
8 to 12	14	7/8
14 and Over	20	1
PVC (all sizes):	6	3/8

END OF SECTION

SECTION 15851
SOIL VAPOR EXTRACTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Wellhead Construction.

B. Airline Gauge.

C. Skid-Mounted Soil Vapor Extraction Equipment and Ancillary Instrumentation.

D. Startup.

1.02 REFERENCES

A. NFPA-70 - National Electrical Code.

1.03 SUBSTITUTIONS

A. Under provisions of Section 01007.

1.04 SUBMITTALS

A. Provide submittals in accordance with Section 01007.

B. Submit manufacturer's product data and information to ENGINEER for approval, for each of the following: vacuum blower; motors; motor starters; vacuum gauges; differential pressure gauge; flow sensor; temperature indicator; silencer; inlet filter, transfer pump; water separate tank, and airline gauge.

C. Submit shop drawings to ENGINEER for approval showing all equipment and controls components mounted on skid, with overall length, width, and height dimensions. Include as-delivered and operating weights for skid-mounted equipment.

PART 2 PRODUCTS

2.01 WELLHEAD MANHOLE CASTINGS

A. Acceptable Manufacturers: Neenah Foundry Company
Neenah, Wisconsin

East Jordan Iron Works
East Jordan, Michigan

2.02 VACUUM BLOWER

A. Type and Model: Rotary lobe type, industrial duty for continuous outdoor service, Sutorbilt Model 4L, vertical configuration with threaded connections.

B. Service: Capable of delivering 200 scfm at an inlet vacuum of 5 inches Hg.

C. Motor: Foot mounted, belt drive, 1,500 rpm, 5 Hp, 230 Volts, three-phase, 60 Hz, explosion-proof. Mount with blower on common, adjustable base with belt guards. Motor shall be suitable for hazardous locations and rated for Class I, Group D, Division 2.

D. Acceptable Manufacturer:
Sutorbilt Products
1800 Gardner Expressway
Quincy, IL 62305
(217) 224-8800

E. Local Supplier/Fabricator:
Fliteway Air Products
7233 North 51st Blvd.
Milwaukee, WI 53223
(414) 357-8780

2.04 INSTRUMENTATION AND CONTROLS

A. Vacuum Gauges: 0 to 80 inches water column.

B. Differential Pressure Gauge: Magnehelic; range from 0 to 50 inches water column.

C. Flow Sensor: Direct-reading vane flow meters within aluminum housing and a carbon steel shunt. Flow meters at each of the extraction wells shall be calibrated for flow rates in the range of 0 to 50 scfm of air. Flow meter on the discharge line shall be calibrated for flows in the range of 0 to 200 scfm of air. Flow meters shall be threaded, and sized for pipe as indicated and configured for mounting vertically.

D. Temperature Indicator: Dial-type immersion thermometer, range from 0 to 120 degrees Fahrenheit.

E. High Pressure Switch: Provide high pressure sensor with signal for vacuum blower shutdown and alarm light, as indicated.

F. High Temperature Switch: Provide high temperature sensor with signal for vacuum blower shutdown and alarm light, as indicated.

G. Airline Gauge: 4 1/2 inch dial-type with altitude pointer, range 0 to 30 feet of water.

H. Acceptable Manufacturer:
Marsh/Marshalltown Instruments-
Airline Gauge
108 South Colorado
Hastings, NE 68901
(402) 463-3390

Dwyer Instruments-
Vacuum Gauges and Temperature Indicators
P.O. Box 373
Michigan City, IN 46360

ERDCO Engineering Corp. - Flow Meters
P.O. Box 6318
721 Custer Avenue
Evanston, IL 60202

2.05 ANCILLARY COMPONENTS AND ASSEMBLY

A. Discharge Silencer: Size and model compatible with vacuum blower.

B. Inlet Filter: Size and model compatible with vacuum blower.

C. Water Separator Tank: Nominal 80-gallon capacity. Model compatible with vacuum blower. Provide level switches as indicated. Water separator tank and level switches to be configured to provide for proper operation of the transfer pump.

D. Transfer Pump and Motor: Pump rated capacity 0 to 5 gpm at 10 to 25 feet TDH. Automatic operation, electric controls, intrinsically safe. Provide electric motor-driven pump (maximum 1 Hp, 230 volts, three-phase, 60 Hz) and all relays and controls necessary for automatic operation. Motors shall be rated for hazardous locations, Class 1, Group D, Division 2. Provide threaded outlet piping connection.

E. Vacuum blower and ancillary components to be pre-assembled and skid-mounted, in accordance with Section 01007. Maximum skid dimensions to be 30 inches wide by 60 inches long by 60 inches high.

PART 3 EXECUTION

3.01 WELLHEAD COMPLETION

A. Install soil vapor extraction wellheads as indicated.

3.02 STARTUP

A. Coordinate startup activities with ENGINEER's Site Representative.

B. Test and place in working order all equipment and instrumentation. Verify that each piece of equipment has been checked for proper lubrication, drive rotation, or other conditions with may cause damage.

C. Verify that tests, meter readings, and specified electrical characteristics agree with those required by equipment manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

END OF SECTION

SECTION 16000
GENERAL PROVISIONS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work to be performed under this specification includes all labor, materials and equipment required to install a complete electrical system as described in these specifications and as shown on the drawings.

B. All labor, materials and equipment shall also be subject to all applicable sections of Division 0 and Division 1 forming a preface and are a part of these specifications.

C. Before submitting a bid, the Contractor shall examine the drawings and specifications, visit the site of the work, and inform himself of local conditions, all federal, state and local ordinances, regulations and all other pertinent items which may affect cost, schedule, and completion of this project.

D. Drawings accompanying these specifications are a part of these specifications. Drawings are intended to show general arrangement, design and extent of work and are more or less diagrammatic. Drawings are not intended to show exact locations except where dimensions are shown. Electrical work is shown on plans using standard industry symbols. Before ordering materials or doing work, the Contractor shall verify all measurements pertaining thereto and assume responsibility therefor. Any substantial differences existing between drawings and conditions in the field shall be submitted to the Engineer for consideration before proceeding with work.

E. All excavations and backfilling required to complete electrical work shall be provided by the Contractor and shall be done to the satisfaction of the Engineer.

F. The Contractor shall provide all plywood backups, and supports for all electrical equipment as indicated on drawings and as required or specified.

G. All materials required to complete the electrical work shall be furnished by Contractor unless specifically noted otherwise.

H. All equipment and materials shall be new, unused, and manufactured in accordance with the following standards, where applicable:

Institute of Electrical and Electronic Engineers (IEEE)
American National Standards Institute (ANSI)
National Electrical Manufacturers Association (NEMA)
Insulated Power Cable Engineers Associations (IPCEA)
American Society for Testing and Materials (ASTM)

I. All equipment and materials, if of the type tested by the Underwriters Laboratories and/or Electrical Testing Laboratories, Inc., shall bear their label and shall be used or installed in accordance with any instruction included in the listing by the laboratory. Contractor shall not modify new equipment in such a way as to nullify the Testing Laboratories label.

J. A set of prints shall be kept at the job site upon which all changes and deviations from the original design are to be recorded. All changes shall be clearly marked in "red". This set shall be submitted to the engineer at the end of the project for preparation of "record drawing". These drawings shall indicate as a minimum, all changes made to the drawings, changes in circuiting, equipment location, embedded conduit, and all other significant changes and deviations from the original design.

1.02 WORK NOT INCLUDED

A. In general, all motors will be furnished with equipment. The Contractor shall provide all motor connections as shown on the drawings and as specified herein. Contractor shall also furnish disconnecting devices as indicated and as required by National Electrical Code (N.E.C).

B. Contractor shall not paint electrical equipment unless specifically noted otherwise.

C. Electrical work required under the scope of another Contractor, by the Owner, or all other work that is clearly not shown on the drawings or indicated in the specifications, is therefore not apart of this contract.

D. In general, controls for equipment will be by the Equipment Supplier unless specified otherwise. Control wiring between equipment and remote devices, motor controls, and etc. as noted or as shown on the drawings shall be by the Contractor.

1.03 TEMPORARY ELECTRIC POWER

A. OWNER will provide electrical power of 100 Amp., 120/240 Volt, 1-Phase temporary electrical service for construction purposes and remove this service at the end of the project. If any Contractor requires more power or 3-phase power for construction purposes, he shall make his own arrangement.

B. Contractor shall provide for use by all Contractors all necessary electrical equipment, including wire, conduit, lamps, sockets, switches, receptacles and any other distribution equipment for temporary service noted above.

C. Contractor shall provide temporary lighting sufficient to enable all trades to complete their work and to enable the Owner or Engineer to check all work as it is being done.

D. Each Contractor shall furnish his own extension cords and lamps other than those furnished for general lighting.

1.04 CUTTING AND PATCHING

A. The Contractor shall provide all required cutting and patching to complete the electrical work.

B. All openings are to be sealed as required and to the satisfaction of the Engineer.

C. All holes in concrete shall be core drilled. No reinforcement bars or structural members shall be cut.

D. No work of any kind shall be covered up before it has been examined and approved by the proper inspection authority.

E. All work, equipment, and materials shall be protected at all times. All conduits and pipe openings shall be closed with caps and plugs during construction.

F. Conduits, etc., passing through walls or roof shall be properly flashed and counterflashed, and caulked to provide a weathertight installation.

G. Neatly replace, patch and finish in kind adjacent surfaces or features displaced or disturbed in performance of the work. Make joining of new and existing work as inconspicuous as possible. Upon completion of the work, there shall be no discrepancy between new work and existing work. All broken and cut units shall be replaced with new units.

H. Where cutting and patching is required, Contractor shall hire workers skilled in such cutting and patching to do the work.

1.05 CODES, STANDARDS, AND WORKMANSHIP

A. All work shall conform to requirements of Wisconsin State Electrical Code and any local codes and regulations that may apply.

1) DILHR 16. - Wisconsin Administrative Code - Wisconsin State Electrical code, Volume 2 (1990). Incorporates 1990 N.E.C.

NOTE: State codes may be obtained from:

Document Sales - State of Wisconsin
202 South Thornton Avenue
Madison, Wisconsin 53703
Telephone: 608-266-3358

B. All materials shall be new and shall meet requirements of Underwriters Laboratories wherever standards have been set for items in question and shall meet minimum standards of IEEE, ASA, ANSI, NEMA and ASTM.

C. All work shall be installed in accordance with NECA standards of installation.

D. All Permits and inspection fees shall be paid for by the Contractor.

E. All work shall conform where applicable to the Williams-Steiger Occupational Safety and Health Act of 1970 (OSHA), Part 1910, "Occupational Safety and Health Standards".

F. Install all equipment and fixtures forming part of the work of this section in complete accordance with the manufacturers' recommendations.

1.06 SITE WORK

A. The Contractor shall provide excavation and backfill for all electrical underground work as indicated on the drawings and as required. Finish grading and final restoration shall be by the Contractor.

1.07 GUARANTEES

A. The Contractor shall guarantee all materials and workmanship against all defects for a period of 1 year following date of substantial completion and shall replace, at no cost to the Owner, any items found to be defective during that period.

1.08 COORDINATION WITH OTHER TRADES

A. Contractor shall provide one (1) power connection to equipment furnished by other contractors as indicated in electrical drawings. Equipment which requires additional connections for more power or for control or signal purposes shall have these additional connections provided by Contractor supplying this equipment, except as noted on electrical drawings and specifications. These additional connections shall include, but not be limited to, conduit, wire, signal cables and pneumatic lines and their installation.

B. Where it is indicated for Equipment Supplier to provide starters, relays, timers and other control items, these shall all be mounted in an appropriate enclosure as required by the National Electrical Code and shall be prewired and tested at the factory. Equipment shall meet all applicable electrical specifications.

1.09 SHOP DRAWINGS

A. Contractor shall submit three copies of shop drawings to the Engineer for review before fabrication and installation. Shop drawings shall include, but not necessarily limited to schematics, wiring diagrams, dimensions, performance data and any other information required by these specifications or as considered necessary by the Engineer.

B. Review by the Engineer is only for conformance with the design concept of the project and compliance with the specifications and drawings. Engineer's review does not in any way relieve the Contractor, manufacturer or supplier from the responsibility for furnishing materials and performing the work in conformance with the drawings and specifications and in a safe manner.

C. Shop drawings shall be submitted for the following:

Section 16400: Service and Distribution
Main Disconnect Switch (If Required)
Panelboards
Motor Controllers (If Required)
Disconnect Switches (If Required)

D. Prior to submission, the Contractor shall carefully check all data for compliance with specifications. He shall also indicate only that material which is applicable by circling catalog numbers, drawings, etc., to clearly indicate his intent.

E. Shop drawings shall indicate job name, date, and Contractor. Shop drawings shall be submitted in a group for a particular system or category (i.e., lighting fixtures, service equipment, etc.) in brochure form with index or list of equipment. No consideration will be given data not submitted in accordance with the above.

F. The manufacturers indicated in the bid documents shall be used in the base bid. If an "approved equal" is desired to be used, it shall be bid as an alternate to the base bid. Attach to the proposal form, sheet(s) with a brief description of the materials (including source of manufacturer, model number, basic ratings, etc.) along with an "addition to" or "deduct from" the base bid noted on the attached sheet(s).

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 16010
CONTROL PANEL—NONHAZARDOUS LOCATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Supply a control panel for the SVE/groundwater recovery system to operate in manual and automatic mode. Control panel shall include the following components:

1. Main disconnect switch with door interlock.
2. Selector switches and pushbuttons.
3. Pilot lights.
4. Motor starters and thermal overload protection.
5. Control power transformer.
6. Panel enclosure.
7. Fuses and fuse and terminal blocks.
8. Alarm lights.
9. Industrial control relays.
10. Wire duct and ties,
11. All other components required for complete control panel.

B. The control panel shall be suitable for use outdoors in nonhazardous areas.

1.02 REFERENCES

A. NEMA ICS 4 - Terminal blocks for industrial control equipment and systems.

B. ANSI/NFPA 70 - National Electric Code (NEC '93)

C. OSHA29 CFR 1900/1910 - Occupational Safety and Health Administration.

D. Local Codes - Comply with all state and local codes.

E. Underwriter's Laboratories (UL):

1. UL 198 - Fuses
2. UL 512 - Flush holders
3. UL 1449 - Standard for safety transient voltage surge suppressors.

F. NEMA ICS-1, NEMA ICS 1.1, NEMA ICS2, NEMA ICS3, NEMA ICS6.

G. In the event of conflicting requirements between the authorities cited above or between authorities cited and those specified, such disagreement shall be resolved by the Engineer.

H. Nothing in this section, including invocation of specific codes, standards, or specifications, shall relieve the Contractor of the responsibility for compliance with the codes, standards or specifications which are generally recognized to be applicable to the work specified herein.

1.03 MATERIALS AND WORKMANSHIP

A. All electrical materials shall conform to codes and standards in Subsection 1.02 and shall bear approval labels where such labels are required.

1.04 DELIVERY, STORAGE AND HANDLING

A. Control system components shall be delivered properly packaged in factory-fabricated type containers or wrappings which properly protect equipment from damage. The Contractor shall be responsible for all damaged equipment due to improper preparation for shipment.

B. Equipment subject to deterioration by humidity at the project site shall be provided with plastic covers forming a vapor seal and an adequate quantity of desiccant. Desiccant shall be either visible or stored in a manner which can be easily reached for inspection and replacement. Equipment so protected shall be noted on the packing list.

C. Control system components shall be stored in original cartons in a clean dry space protected from weather and construction traffic. The Contractor shall be responsible for observing the equipment manufacturer's storage and handling procedures as required to maintain any implied or stated warranty.

D. Control system components shall be handled carefully to avoid breakages, impacts, denting and scoring finishes. Damaged equipment shall not be installed but returned for replacement at contractor's expense.

1.05 SUBMITTALS

A. The Contractor shall submit all items in accordance with the requirements of Division 1.

B. The Contractor shall submit the following:

1. Drawings and diagrams:

a. Physical drawings indicating dimensions, layouts, arrangements, finishes, weights and installation details (including cable entry provisions, recommended anchoring and leveling methods and anchor bolt layout and sizes) for each subsystem specified. These drawings will be used by the Engineer during installation oversight to accomplish contract administration duties.

b. Interconnection and wiring diagrams indicating terminal block arrangements and connections, and required power, signal and ground wiring to be field-installed.

c. Single-line electrical drawings representing the entire control system and indicating ratings of major electrical equipment and all field devices.

d. Electrical circuit schedules for all wire and cable to be installed and connected. The Contractor shall employ an orderly method of collecting and recording cable information. The indices developed shall provide an accurate record of all pertinent data.

2. Operator's manuals to include, but not limited to:

a. A brief description of control system equipment and basic operating features, including drawings of the consoles and terminals and formats for all displays and printouts.

b. Complete operating instructions to include system start-up, shutdown, recovery and restart.

c. A detailed description of the operational characteristics of the system under normal as well as alarm conditions. The information provided shall include all appropriate operator interactions during normal as well as degraded conditions.

d. Recommended periodic testing procedure for each system component.

e. Schedule and procedures for routine and preventive maintenance and servicing (replacing paper, tapes, bulbs, etc.) of console and terminal equipment.

f. Operating materials list.

3. Maintenance manuals to include, but not limited to:

a. Principles of control system operation and a detailed system description.

b. Manufacturer's data and/or specification sheets for all components utilized in the control system to include dimensions, power requirements and maximum and minimum temperature limits of each, as applicable. Include parts lists with each manufacturer's model number.

c. Unpacking, installation, setup, adjustment, checkout and basic operating instructions.

d. Routine preventive maintenance schedule and procedures.

e. Corrective diagnostic troubleshooting and repair procedures.

f. Charts showing normal operating conditions at significant points (test voltages, waveforms, etc.).

g. Recommended spare parts list.

h. List of ordinary and nonstandard tools and test equipment recommended for testing and servicing.

i. System physical, block, elementary, interconnection and wiring diagrams and drawings.

j. Information pertaining to the Contractor's field service representative.

PART 2 PRODUCTS

2.01 CONTROL VOLTAGE: Nominal 115 VAC, 60 Hz.

2.02 COMPONENTS

A. Main disconnect switch with door interlock:

1. Shall consist of Square-D or approved equal thermal magnetic circuit breaker with a door interlock plate, terminal shrouds for all terminals, shaft, and a handle operator.

2. Rating of breaker shall be as indicated on the drawings.

3. Handle operator shall be flange mounted with provisions for padlocking the operating handle in the open or closed position.

4. Door interlock mechanism shall prevent closing of switch mechanism with the door open.

B. Selector switches and pushbuttons:

1. Shall be Square-D or approved equal Class 9001 with 10 amp continuously rated contacts at 115 VAC.

2. Selector switches shall be non-metallic two or three position type SK and pushbuttons shall be non-metallic type SK, unless another style is shown on the drawings.

3. Switches and pushbuttons shall be oil tite and watertite corrosion resistant. Colors of pushbuttons shall be as indicated on drawings.

C. Pilot Lights:

1. Shall be Square-D or approved equal Class 9001 LED push-to-test with all required mounting hardware.

2. Pilot lights shall have plastic color cap as follows: Red–not operating or closed, Green–operating or open.

3. Provide pilot and alarm lights for the following:

   a. Well Pump: VE-1 Operating (M-101)
   b. Well Pump: VE-2 Operating (M-102)
   c. Well Pump: VE-3 Operating (M-103)
   d. Well Pump: VE-4 Operating (M-104)
   e. SVE Vacuum Blower Operating (M-201)
   f. SVE High Temperature (TAH-232)
   g. SVE High Pressure (PAH-214)
   h. Water Separator Tank High Level (LSHH-202)
   i. Transfer Pump Operating (M-202)

D. Motor Starters and Thermal Overloads:

1. Shall be Telemecanique or approved equal D-or F-line IEC full voltage non-reversing contactor with bimetallic thermal overload relays.

2. Contactor shall be three pole poly phase, 600 volt AC maximum, 50 or 60 hertz with current rating to control the following motors:

Motor	Horsepower	Voltage	Phase
Well Pump: VE-1	1/3	230	1
Well Pump: VE-2	1/3	230	1
Well Pump: VE-3	1/3	230	1
Well Pump: VE-4	1/3	230	1
Vacuum Blower	5	230	3
Transfer Pump	1 (est.)	230	3

3. Coil voltage shall be 120 volts AC at 60 hertz and 100 volts at 50 hertz.

E. Control Power Transformer:

1. Shall be Square-D or approved equal Class 9070 Type KF control power transformer with integral primary and secondary fuse blocks.

2. The size of the transformer shall be determined by the panel builder based on the overall device loads and an addition 25 percent spare capacity as a minimum.

3. Transformer primary voltage rating shall be 230 volts with fuses sized as required. Secondary voltage rating shall be 115 volt AC with fuse size as required.

F. Panel Enclosure:

1. Shall be Hoffman or approved equal NEMA 4x enclosure sized to accommodate all control components plus 10 percent spare mounting space.

2. Enclosure shall be wall mounted lockable with continuously hinged and gasketed door. Doors shall be no wider than 36 inches.

3. Panels shall be constructed of 12 gauge steel with continuously welded seams ground smooth, no holes or knock-outs.

4. Stainless steel door clamps on three sides to assure water-tight seals.

5. A print pocket shall be provided on inside of door.

6. An equipment mounting panel shall be provided on back of enclosure.

7. Panel finish shall be ANSI 61 gray polyester powder coating inside and out over phosphate coated metal surfaces. Mounting panel shall be painted white enamel.

8. Panel shall have provisions for flange mounted main disconnect and door interlock mechanism as described in Subsection 2.02.A.

9. Enclosure shall have inner door to mount pilot lights and switches with an outer door than can be locked to protect lights and switches.

G. Fuse Blocks, Terminal Strips and Fuses:

1. Fuse blocks and terminal strips shall be Square-D Class 9080 Type G NEMA rated suitable for rail mounting. All wiring to and from control panels shall terminate at marked terminals.

2. Fuses shall be miniature type 13/32-inch-diameter by 1 1/2 inches long sized as shown on drawings or required.

H. Alarm Lights: Warning lights shall be Edwards heavy duty strobe light mounted on top of panel Series #94. Unit shall be weatherproof with red colored lexan lens. A clear protective lexan dome shall protect lens. Unit shall operate at 120 volts AC.

I. Industrial Control Relays

1. Standard control relays shall be Square-D Class 8501 or approved equal. Timing relay if required shall be Class 8501 Type JCK. Relays shall have 10 amp rated contacts at 115 volts AC.

2. If required, intrinsically safe relays shall be:

a. Intrinsically safe relays shall be FM listed as safe for use in Class I, Division 1 and 2 Group A, B, C, D, E, F, and G areas.

b. Barriers shall be provided in control panel enclosure to separate intrinsically safe relays and terminal points from all other components and wiring.

c. Square-D Class 8501 Type TO of the type shown on drawings.

J. Wire Duct and Ties

1. Wire ducts shall be restricted slot design with covers. Duct shall be made of PVC. Size of duct shall be determined based on quantity and size of wiring. Duct shall as manufactured by Panduit or approved equal.

2. Wire ties shall be STA-STRAP as manufactured by Panduit or approved equal.

3. All wiring in control panels shall be bundled neatly and firmly attached to control panel using wire ties and/or wire ducts.

K. Wire Type

1. Control:

   a. Stranded copper.

   b. Insulation rated for 600 volts, 90°C, Type MTW or TFFN.

2. General Power and Lighting:

   a. Stranded copper.

   b. Insulation rated for minimum of 600 volts, 75°C, Type THW.

3. Power and Control in Proximity of Heating Devices:

   a. Nickel plated stranded copper.

   b. Insulation rated for 600 volts, 250°C, Type TAGS/TAGT.

   c. Acceptable manufacturer: Rockbestos Copper Firezone 101.

4. Low Power Electrical Signal: Shielded cable.

L. Wire Size: Size D wire and cable to comply with NEC requirements on allowable current carrying capacities.

M. Wire Color Coding:

1. All neutral wires shall be white.

2. All ground wires shall be green.

3. 460 VAC, 230 VAC and 200 VAC power wires shall be black.

4. 115 VAC control and enclosure lighting wires shall be red.

5. D.C. wires shall be blue.

6. Interconnection wires energized from external source shall be yellow.

7. Equipment wiring other than Items P.1 through P.6 shall be Control Panel manufacturer's standard.

8. Intrinsically safe wiring in control panel enclosure shall have a unique and separate marking system from all other wiring. Preferably light blue wire insulation shall be used for all intrinsically safe wiring.

N. Wire Terminations:

1. Strap screw terminals are preferred on all terminal boards and devices.

2. Tubular clamp with pressure strap terminals is acceptable.

3. Tubular screw type terminals without pressure strap shall not be used.

4. Power cables shall be terminated to flat bus with two hole lugs.

5. Terminations to power studs with one hole lugs are permitted if cable and lug are fastened to prevent turning.

6. Power cable lugs shall be tin dipped copper, circumferential compression type, and sized to match the wire gauge.

7. High temperature termination lugs shall be the high temperature type, made of uninsulated stainless steel or nickel plated copper.

8. High temperature termination wire markers shall be Thomas & Betts E-Z Type WMT (aluminum with 450°F adhesive).

O. Wire Tagging:

1. Tag all control wires on both ends which match the wire numbers on the drawings using the following methods of tubular wire markers: Electrovert Type Z; Thomas and Betts Series SM or Type WHT; or Brady Type OMNI-GRIP.

2. Tag all of motor leads and A.C. feeders with number which match the wire numbers on the drawings use one of the following: Electrovert Type Z cable or wire markers; Thomas and Betts self laminating wire markers Type WSL.

P. Nameplates

1. Provide 3-ply laminated plastic nameplates with 3/16 inch black on white letter below each control device such as switches, pushbuttons, and pilot lights.

2. Provide 3-ply laminated plastic nameplate for panel with 1/2 inch black on white lettering.

3. Lettering on nameplates to be determined by Engineer during shop drawings review.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS:

A. Supply all tools and labor required to fabricate, assemble, and wire electrical panels covered by this specification.

B. Supply all material except that specified as being supplied by others.

C. All non-current carrying parts of equipment and enclosures shall be bonded together to provide an integral grounded system.

3.02 FABRICATION:

A. Fabricate Control Panel of prime stock steel, free of tool and clamp marks. Cut plates on squaring shears to ensure tight, flush joints when butted together.

B. Steel thickness shall conform to NEMA standards with minimum allowable thickness of gauge.

C. Control Panel shall be cleaned to remove all rust, mill scale, oil, and foreign matter and shall be painted with at least one coat of sealing primer over a bonderized surface, or two coats of sealing primer. Sealer shall be sanded smooth, and a minimum of two coats of finish paint shall be applied.

D. Interior of all enclosures shall be painted white.

E. Paint color for exterior of all enclosures shall be Control Panel manufacturer's Standard Color.

3.03 ASSEMBLY

A. Control Panel shall be assembled according to CONTRACTOR's submittals reviewed and accepted by Engineer.

B. Starters, contactor, relays, and other control devices shall be front mounted on a rigid metal panel.

C. Equipment shall be mounted on mounting panel so that any device can be removed without removing mounting panel.

D. No equipment shall be mounted behind door pillars unless adequate space is provided for removal and servicing.

E. No devices shall be mounted on panel exterior.

F. No electrical components shall be mounted on the enclosure sidewalls or bottom except for wire duct.

G. Three-ply laminated plastic nameplates, white with black 3/16-inch lettering shall be attached as indicated to mounting panel above each component for identification. Identical tapewriter nameplates shall be attached to devices within the enclosure.

H. Drawing pockets shall be provided on inside of one door of the enclosure.

I. Provide minimum spare Control Panel space of 20 percent for future components.

J. Components within panel shall be arranged to allow for bottom entry of conduits into control panel.

3.04 WIRING

A. Run all wires on mounting panel inside plastic wiring duct. Run low voltage signal circuits in a separate duct from the 115 VAC and higher voltage circuits.

B. All door mounted devices shall be wired to a terminal block with adequate slack and support at hinge to prevent wire damage.

C. All outgoing wires shall terminate on terminals, except load side leads of motor contactor rated over 50 ampheres. Low voltage signal circuits shall terminate on terminals separate from the 115 VAC and higher voltage terminals.

D. Provide separate ground bus terminal block, with each connector bonded to enclosure.

E. Each panel shall have 20 percent spare terminals, with a minimum of 10 spares.

3.05 INSPECTION AND TESTING

A. Tests

1. The Contractor shall perform and document the following tests:

   a. Wiring Check Tests: A continuity check on each circuit supplied shall be performed. This test shall verify terminal connections are tight and terminal designation numbers are as shown on the latest approved drawings.

2. The Contractor shall completely assemble and interconnect the equipment and shall perform an Acceptance Test. This integrated testing is intended to verify compliance with the specified operational requirements stated herein prior to release of the system for shipment. This test shall simulate, insofar as practical, actual operating conditions for all control and non-control programs. Prior to start of the Factory Acceptance Test, the control system shall be operated at normal power for a burn-in period of not less than 16 continuous hours.

3. The hardware verification portion of the test shall include the following as a minimum:

   a. Random equipment cabinet wiring continuity testing based on system drawings.
   b. System operation tests at minimum, normal and maximum voltage.

4. Changes necessary for the system to perform the specified functions shall be made in a permanent manner and retested before completion of the test activities.

5. The duration of the Acceptance Test shall be as required to successfully complete all test procedures.

6. The system shall not be released for shipment with any outstanding system deficiencies that in any way impact system integrity.

B. Field Verification Tests

1. Field tests to verify that the system hardware as approved for shipment, function in the same demonstrated manner after installation of the control system shall be performed at the site. The Contractor shall provide any technical assistance required during the tests. These tests shall be performed on the entire system.

2. Where possible, malfunctioning components shall be corrected at the site; otherwise, the Contractor shall remove and replace. Upon correction/replacement, the component shall be retested.

3. System hardware acceptance will be provided upon satisfactory completion of the approved system hardware verification tests at the site.

3.06 TRAINING

A. The Contractor shall provide on-site training for operating and service personnel designated by the owner.

1. Operating personnel shall receive detailed instruction in operating procedures, routine preventive maintenance.

2. Servicing personnel shall receive detailed instruction in principles of operation, setup, adjustment, routine preventive maintenance, diagnosis and corrective repair of all equipment.

3. End-users shall receive detailed instruction in the operation and use of control system equipment.

B. Training shall be conducted by experienced, knowledgeable personnel, supported by modern training aids and shall utilize the actual system being supplied as much as possible. Participants shall receive individual copies of all pertinent technical manuals and documentation which apply specifically to the control system hardware and software.

3.07 WARRANTY MAINTENANCE

A. The Contractor shall provide "on-call" maintenance service for all equipment supplied under this Contract for 1 year after acceptance of the entire control system (hardware and software) by the owner. The service shall consist of material and labor as follows:

1. Respond to emergency service requests within 24 hours.

2. Replace all defective components as required.

B. Hardware maintenance of the central processors during this period shall be furnished by the processor supplier.

END OF SECTION

SECTION 16100
BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Raceway and Fittings

B. Wire and Cables

C. Pull and Junction Boxes

D. Outlet Boxes

E. Wire Connections and Connecting Devices

F. Raceway, Fixture and Equipment Supports

G. Identification

PART 2 PRODUCTS

2.01 RACEWAY AND FITTINGS

A. All conduit shall be hot-dipped, galvanized rigid steel (G.R.S.), sizes as shown on the drawings, 3/4-inch minimum. Exposed conduit runs not exceeding 10 feet in length and terminating at a single device may be 1/2-inch, subject to National Electrical Code fill limitations. Conduit shall be manufactured by Republic Steel, National Electric Products, Youngstown, Triangle, or Allied.

B. In applications and where conduit is concealed or not exposed to physical damage, electrical metallic tubing (EMT) may be used. EMT may be used for offices, store rooms, basements, etc., provided it is not exposed to physical damage.

C. PVC conduit (heavy wall - Schedule 40) may be used when encased in concrete, when buried below slab, or when underground except under driveways or parking lots unless encased in concrete. Provide a 6-inch sand cushion all around PVC conduit buried in the ground as shown on the drawings. All PVC conduits shall be buried at least 24 inches below grade unless required by code to be greater or where indicated to be greater on the drawings. Provide a separate ground wire in each PVC conduit. Provide insulation bushing or bell-ends on both ends of conduit (unless connected to steel conduit) to prevent damage to wire or cable. See drawings for conduit sizes.

D. Each piece of conduit shall be straight, free from internal and external defects, of uniform wall thickness and accurate circular cross section throughout, cut and taper reamed, furnished in 10' lengths and threaded at each end.

E. Couplings shall be supplied at one end of each 10' length of conduit with thread protection at the other end. All threads should be cleanly cut.

F. Each 10 foot length of conduit shall be labeled with an Underwriter's Laboratory label showing the manufacture's name and/or trademark.

G. All conduits shall be free from all burrs and shall be swabbed to remove all foreign matter.

H. Conduit fittings for heavy wall conduit shall be malleable or gray iron, plated, with threaded hubs, plated stamped steel covers, and solid oil resistant synthetic rubber gaskets. No holes shall be drilled in the conduit fittings for mounting purposes. "Telephone" ells or "short" ells are not acceptable.

I. Couplings and connectors for electrical metallic tubing shall be watertight and compression type. Set screw and indenter type fittings are not acceptable.

J. All exposed conduit (utility areas) shall be run parallel or perpendicular to building walls. Any conduit run under floor slab shall be heavy wall, galvanized rigid steel unless noted otherwise herein.

K. Provide a threaded, insulated grounding bushing for all conduits utilized for feeders from and to panelboards, motor controls and all other feeders 100 amperes or greater.

L. Final conduit connections to motors and any other equipment subject to vibration shall be with greenfield (for dry area) or PVC-jacketed greenfield (for wet, exterior or finished areas).

M. Where conduits pass through exterior walls or footings below grade, the entrance shall be made watertight.

N. Conduits passing through masonry structures shall be either sleeved allowing 1/2" clearance on each side of the conduit or be wrapped with 3M #50 Scotch wrap tape if embedded in the masonry.

O. Conduits shall not be secured to or come in contract with pipes. Pipe flange bolts and equipment bolts shall not be used to anchor conduits or conduit supports. Conduits shall be supported by piping or other conduits. Conduits shall clear heated surfaces, heated pipes, and insulation by at least six inches (6")

P. Spare conduits or those indicated for "Future" use shall be closed by threaded plugs or caps.

Q. All raceway systems shall be cleaned of debris and moisture prior to installing electrical conductors.

R. Where conduit passes between areas subject to different temperatures, the conduit shall be sealed to prevent interchange of air and formation of condensation. This shall be done by use of a conduit fitting and Duxseal or other approved removable mastic material as shown on the drawings.

S. Where making a transition from PVC conduit to heavy wall steel conduit, use only UL labelled PVC fitting designed as a transition fitting, maintaining the watertightness of the conduit system.

T. All raceways installed in monitoring or wet wells shall be suitable for hazardous locations as defined in the NEC Article 500 for Class I, Group D, Division 1 locations.

2.02 WIRE AND CABLES

A. All conductors for 120V through 480V systems shall be rated 600 volts, and shall be stranded copper unless noted otherwise. Minimum wire size shall be #12 AWG unless specifically indicated otherwise.

B. Wire insulation for all 120V through 480 volt distribution, power, lighting and control shall be 600V, 75 C, THWN or XHHW unless specifically indicated otherwise. Insulation shall be suitable for wet and dry locations and be flame retardant.

C. Power wiring of different potentials shall not share the same conduit or raceway system unless specifically indicated otherwise.

D. Install 600V, 90 C RHHN, THWN or XHHW wire where feeding through fluorescent fixture.

E. Provide copper or galvanized fish wire in all empty conduits.

F. Color Coding: 240/480 V

A phase	Black
B phase	Red
C phase	Blue (If Required)
Neutral	White
Equipment Grnd.	Green

G. Power conductors may be black with the proper color notation marked at each end of the conductor.

H. Identify exposed ends of all power cables in panels, cabinet, motor control centers, pull boxes, etc., with Scotch #35 color coded color coding.

I. All power, control and instrumentation wiring shall be installed in conduit unless specifically indicated otherwise.

J. Underground direct buried cable shall be polyvinyl chloride, insulated and jacketed, type UF or USE. No splices will be permitted in direct buried runs except as approved by the Engineer.

K. All control wire shall be copper stranded with no conductor being smaller then #16 AWG with the exception of special cables used for telephone, instrumentation, and data systems.

L. Control wiring shall not be spliced other then at a terminal strip or to leads permanently attached to a control device.

M. All control wiring shall be numbered at each end according to the drawings with a wire number label that will hold up against oil and moisture. The entire wire number shall be clearly printed on only one tag at each end.

N. All power, control and instrumentation wiring shall be installed as indicated below:

1) Wire shall not be installed until all work of any nature that may cause injury to the wire is completed.
2) Mechanical means shall not be used in pulling wires #8 or smaller.
3) Approved wire pulling lubricant shall be used as required to prevent insulation damage and over-stressing of the wire while pulling through conduit.
4) All wiring of panelboards, cabinets, etc., shall be neatly wrapped, taped, or laced into groups to provide a neat and orderly appearance.
5) If the size and number of conductors in a conduit on the drawing is not show, then it shall be assumed to 3#12 wires.

2.03 PULL AND JUNCTION BOXES

A. All pull and junction boxes except in wet areas shall be galvanized after fabrication, NEMA 1 gasketed with screw or hinged covers. These boxes shall be manufactured by Hoffman Engineering Company or approved equal.

B. Pull and junction boxes in wet areas shall be FS or FD cast malleable iron. In wet but non-corrosive areas, NEMA 4 boxes may be utilized. All cast fittings shall be provided with threaded hubs. Cast fittings shall be manufactured by Appleton, Crouse-Hinds, Killark, O-Z or approved equal.

C. Boxes shall be sized as indicated on the drawings or as required by the National Electrical Code. Boxes shall also be located as indicated on the drawings or as required for the work involved.

D. Unused openings in boxes and fittings shall be plugged with suitable devices rated for the proper environment.

E. All rigid conduit terminations at pull boxes, junction boxes, and other electrical enclosures or equipment shall be made utilizing a threaded rigid conduit hub with insulated bushing.

F. Where several feeders pass through a common pull box, wires shall be tagged to indicate clearly their electrical identification, circuit number, and panel designation.

G. All conduit entry into boxes in wet areas shall be through the side or bottom with a condensation drip tee mounted at the lowest point in the conduit.

H. Boxes in dusty or dirty areas such as mechanical and maintenance areas shall have a NEMA 12 or 13 rating.

I. All boxes used with PVC conduit shall be made of PVC and shall have hubs to form watertight joints. They shall have mounting lugs or mounting holes which do not destroy the watertight requirements of the PVC conduit system. PVC boxes shall not be used to support light fixtures or other electrical equipment.

J. Boxes designed as terminal boxes (TB) shall be furnished with subpanels and terminal blocks. Terminal blocks shall be 600 volt, channel-mounted, tubular screw type, with pressure plate, with vinyl marking strips, end barriers and end anchors. Terminal blocks shall be Allen-Bradley Bulletin 1492 Style CA1, Square-D Class 9080 Type G or

equal. A minimum of 20% spare terminals shall be provided. Wire numbers shall be put on the marking strips in a neat and legible manner. Terminal strip shall be marked with either the wire number or terminal number as specifically shown on the drawings.

K. All pull and junction boxes installed in hazardous areas as defined in Article 500 of the National Electrical Code shall be suitable and rated for the proper Class, Group and Division for use in hazardous locations.

2.04 OUTLET BOXES

A. In general, outlet boxes shall be galvanized, 4-inch, 2 1/8 inches deep, and of the type and size required or specified. Boxes shall be manufactured by Appleton, RACO, Steel City or approved equal.

B. Cast boxes shall be type FS or FD malleable or gray iron, cast body and hubs, gasketed cover and external mounting lugs. Cast boxes shall be manufactured by Appleton, Crouse-Hinds or approved equal.

C. In mechanical, utility, storage and other non-finished areas, outlet boxes shall be 4-inch square with 1/2 inch raised covers.

D. Switch boxes shall not be installed under any circumstances. All #6-32 machine screw ears shall turn in toward the box centerline and not out as is typical of switch boxes and some plaster rings.

E. Location of outlets shown on drawings is approximate. The Contractor shall study buildings plans in relation to spaces and equipment surrounding each outlet so that lighting fixtures are symmetrically located according to room layout. When necessary, with approval of the Engineer, outlets shall be relocated to avoid interference with mechanical equipment or structural features.

F. For outlet boxes installed outdoors and where weatherproof outlets are indicated, provide cast malleable iron boxes with gasketed covers to form a watertight installation.

G. Boxes in dusty or dirty areas shall have a NEMA 12 or 13 rating.

H. All boxes used with PVC conduit shall be made of PVC and shall have hubs to form watertight joints. They shall have mounting lugs or mounting holes which do not destroy the watertight requirements of the PVC conduit system. PVC boxes shall not be used to support light fixtures or other electrical equipment.

I. All outlet boxes installed in hazardous areas as defined in Article 500 of the National Electrical Code shall be suitable and rated for the proper Class, Group and Division for use in hazardous locations.

2.05 WIRE CONNECTIONS AND CONNECTING DEVICES

A. In general, Hubbell catalog numbers are indicated. Equivalent Arrow-Hart, Eagle, Leviton, P & S, or Sierra devices are also acceptable. See Symbol Schedule for type of devices required.

B. All duplex receptacles shall be specification grade, NEMA 5-20R, rated 20 amperes and 125 volts. Receptacles shall be constructed of impact resistant nylon. Contacts shall be triple-wipe for minimum heat rise and maximum plug retention. Receptacle color shall be ivory unless specified otherwise. Receptacles shall be a Hubbell 5362-I or equal.

C. All switches shall be specification grade, quiet type, rated 20 amperes and 120-277 volt. Switch shall be constructed using heavy duty thermoset body with sturdy mounting strap. Contacts shall be either silver or silver cadmium oxide to reduce contact erosion. Switch color shall be ivory unless specified otherwise. Switches shall be a Hubbell 1121-I series or equal.

D. All light switches shall be mounted at 48 inches above the finished floor level to the center of the box, unless noted otherwise on the drawings.

E. Plates for utility, mechanical, and storage area to be 1/2-inch raised steel covers.

F. When multiple devices are connected on one circuit such as duplex receptacles, circuit shall not feed through device but shall utilized "pig-tail" type wiring.

G. All splices for wire sizes #16 through #10 AWG shall be made with 3M Co. "Scotchlock" brand electrical spring connectors in accordance with manufacturer's recommendations. Wire #8 and larger: parallel clamp bolted or hydraulically swaged. Split-bolt connectors are not acceptable.

H. All cable and wire connections and terminations shall be made with compression deforming type connectors as manufactured by Burndy Corp., Thomas & Betts Co. or equal.

I. Install separate green ground wire from motor or equipment to J-box beyond greenfield.

J. All underground Low Voltage Splices shall utilize a case splice employing a plastic mold and using epoxy resin equal to that manufactured by Minnesota Mining and Manufacturing Co. "Scotchcast" Kit No. 82-A, or as manufactured by Hyso Corporation "Hyseal" epoxy splice is acceptable. This means of splicing is the only type acceptable for low voltage wires in direct buried runs.

K. All splices in ground (or neutral) conductors shall be braized. All taps in neutral conductor (for connection to ground rods, etc.) shall be made with cast copper 3-way hinged connector equal to T&B #350005 without cutting ground cable. Ground cable shall be continuous.

2.06 RACEWAY, FIXTURE AND EQUIPMENT SUPPORTS

A. Structural supports for raceway, fixtures, panels, boxes, and all other electrical equipment shall be by the Contractor.

B. In general, supports for fixtures and electrical equipment shall utilize a pre-engineered strut system including channel, fittings, hardware and accessories for a matched system. Strut system shall be manufactured by Unistrut, B-Line or approved equal.

C. All electrical fixtures, devices, and equipment shall be securely mounted to building structure and shall not depend upon ceiling or wall surfaces for their support. They shall be incapable of being rotated or displaced. Support attachment shall adequately support weight of fixture, device, or equipment plus weight of support attachment.

D. The Contractor shall provide plywood backups and/or strut supports for all electrical raceway, equipment and fixtures as indicated on drawings and as specified.

E. Mounting to prestressed concrete structural members shall be done as recommended by prestressed concrete structural member supplier. In no case shall explosive charges or hammer drills be used on members. All drilling shall be done with carborundum drills or core drills and shall be done in pan section of tee units and in sections of members where no reinforcing steel is present.

F. In general, drawings include various construction, installation and support details. Details are typically provided for special fixture, conduit, equipment supports. Any discrepancy between details shown on the drawings and this specification, shall be brought to the attention of the engineer for resolution.

2.07 IDENTIFICATION

A. Install by bolting, engraved plastic laminated nameplates with 1/4-inch high letters on all panelboards, cabinets, motor controls, junction boxes, etc. Engraved plastic laminated nameplates shall be black on white background.

B. Master nameplates for panelboards and motor controls shall indicate: (1) equipment name or identification number, (2) voltage system. Nameplates for individual MCC units of switchboard units shall indicate equipment or feeder name and identification number. All switchboards, panelboards, junction boxes, motor control centers, etc., shall be clearly labeled as to voltage of cable or system terminated therein.

C. Equipment, disconnect switches, motor starters, pushbutton stations, panels, switchgear, special device plates, and similar materials shall be clearly and permanently marked using plastic laminated nameplates.

D. Provide typewritten circuit directories in all panelboards with clear plastic protection shields and mounted in card holders.

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 16162
SEQUENCE OF OPERATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Controls logic for operation of the SVE/groundwater recovery system.

1.02 SUBMITTALS

A. Under provisions of Section 01007.

PART 2 OPERATIONAL SEQUENCE

2.01 OPERATION OF WELL DEWATERING AND WATER SEPARATION SYSTEMS

A. Control well pump P-101/M-101 from hand-off-auto switch HS-101, high level sensor LSH-301, and low level sensor LSL-301 in the extraction/recovery well VE-1.

B. Control well pump P-102/M-102 from hand-off-auto switch HS-102, high level sensor LSH-302, and low level sensor LSL-302 in the extraction/recovery well VE-2.

C. Control well pump P-103/M-103 from hand-off-auto switch HS-103, high level sensor LSH-303, and low level sensor LSL-303 in the extraction/recovery well VE-3.

D. Control well pump P-104/M-104 from hand-off-auto switch HS-104, high level sensor LSH-304, and low level sensor LSL-304 in the extraction/recovery well VE-4.

E. Control transfer pump P-202/M-202 from hand-of-auto switch HS-202, high level sensor LSH-202, and low level sensor LSL-202 in the water separator tank.

F. When in the "auto" mode, shut down the well pumps (P-101/M-101, P-102/M-102, P-103/M-103, P-104/M-104) when the SVE vacuum blower M-201 is not operating.

2.02 OPERATION OF SOIL VAPOR EXTRACTION SYSTEM

A. Control vacuum blower M-201 from hand-off-auto switch HS-201.

B. When in the "auto" mode, shut down the vacuum blower M-201 upon "high temperature' signal TAH-232 from the downstream temperature sensor.

C. When in the "auto" mode, shut down the vacuum blower M-201 upon "high pressure" signal PAH-214 from the downstream pressure sensor.

D. When in the "auto" mode, shut down the vacuum blower M-201 upon "high-high" signal LSHH-202 from the water separator tank.

E. When in the "auto" mode, shut down the vacuum blower M-201 when the transfer pump M-202 is operating. Restart the vacuum blower M-201 when the transfer pump M-202 has completely blown down the water separator tank.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 16400
SERVICE AND DISTRIBUTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Service Entrance

B. Main Disconnect Switch

C. Metering

D. Disconnect Switches

E. Grounding

F. General Lighting and Power Panelboards

G. Motors and Motorized Equipment Installation

H. Motor Starters

PART 2 PRODUCTS

2.01 SERVICE ENTRANCE

A. The Contractor shall provide all conduit, wire and meter socket as shown on the drawings and as specified herein.

B. Contractor shall verify all requirements set forth by the local utility. If there is any discrepancy between the requirements set by the Utility and what is shown on the Drawings and specifications, then the contractor shall notify the engineer. The Contractor shall also make all arrangements and coordinate the service entrance installation with the Utility.

C. The Contractor shall restore all underground trenches by the Utility to like-original condition. Provide compaction as specified in Section 02221 of this specification, or as indicated on the drawings.

2.02 MAIN DISCONNECT SWITCH (IF REQUIRED)

A. Furnish and install a service entrance main fusible disconnect switch as specified herein and as shown on the drawings. The main disconnect switch shall meet the latest requirements of Underwriters Laboratories, NEMA and the National Electrical Code.

B. Main disconnect switch shall be manufactured by Square-D, Westinghouse, I.T.E., Cutler-Hammer or approved equal.

C. The main disconnect switch shall be a fusible heavy duty type with ratings as shown on the drawings. The switch shall have quick make, quick break mechanism, inter phase barriers and arcing equipment. Switch shall be manually operated. The switch shall have an interrupting rating of 12 times the continuous rating in accordance with UL standard 977.

D. The switch shall be provided with cover interlocks and provisions for padlocking the switch in the "OFF" position.

E. The main disconnect switch shall be equipped with a neutral bus and the switch shall be rated to be used as service entrance equipment in accordance with the National Electrical Code.

F. Fuses for the main fusible switch shall be Bussmann "LOW-PEAK YELLOW" type and sized as noted on plans. Provide one (1) extra set of fuses to be stored inside the enclosure. Equivalent Gould-Shawmut or Economy Brand fuses may be submitted for engineer's evaluation.

G. Provide and install on the inside of the door of the main disconnect switch section a type copy with transparent protective cover with the following information:

1) Fuse Amperage
2) Fuse Type
3) Fuse Class
4) Fuse Voltage Rating
5) Fuse Manufacturer

2.03 METERING

A. Metering for revenue collection by the Utility shall be as specified by the Utility and as shown on the drawings and as specified herein. If there is any discrepancy between the requirements set by the Utility and what is shown on the drawings and specifications, then the contractor shall notify the engineer.

B. In general, contractor shall provide secondary lateral conduits, C.T. enclosure (if required), and meter socket(s) as shown on the drawings.

C. The Utility will provide meter and C.T.'s (if required).

2.04 DISCONNECT SWITCHES

A. Furnish and install heavy duty safety switches as indicated on the drawings and/or as required by the Nation Electrical Code. All safety switches shall be NEMA Type HD and shall be UL listed. All safety switches shall be fusible unless specifically indicated or specified otherwise. Disconnect switches shall be manufactured by Square-D, G.E., Cutler-Hammer or Westinghouse or approved equal.

B. All switches shall have switch blades which are fully visible in the "OFF" position when the switch door is open. All current carrying parts shall be plated to resist corrosion and promote cool operation. Switches shall have removable arc suppressors where necessary to permit easy access to line side lugs. Lugs shall be front removable and UL listed for use with both aluminum and copper conductors.

C. Switches shall be quick make, quick break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening action of the contacts has started. The operating handle shall be an integral part of the box, not the cover.

D. Provisions for padlocking the switch in the "OFF" position with at least three locks shall be provided. Switches shall have a dual cover interlock to prevent unauthorized opening of the switch door when the handle is in the "ON" position, and to prevent closing of the switch mechanism with the door open. The handle shall clearly indicate whether the switch is "ON" or "OFF".

E. Fuse sizes shall be as indicated on the drawings or as recommended by the equipment manufacturer. If there is any discrepancy between fuse sizes set by the manufacturer and what is shown on the drawings and specifications, then the contractor shall notify the engineer.

F. Fuses for fusible switches shall be dual element, Bussmann type FRS or FRN fustron. Equivalent Gould-Shawmut or Economy Brand fuses may be submitted for engineer's evaluation.

G. Switches shall be heavy duty and be horsepower rated. The UL listed short circuit rating shall be 200,000 symmetrical amperes when Class R or Class J fuses are used. The UL listed short circuit rating shall be 10,000 symmetrical amperes when Class H fuses are used.

H. Provide and install on the inside door of all fusible disconnect switches a typewritten copy with a transparent protective cover with the following information:

1) Fuse Amperage
2) Fuse Type
3) Fuse Class
4) Fuse Voltage Rating
5) Fuse Manufacturer
6) Unit or Circuit Protected by Fuse

2.05 GROUNDING

A. Ground service neutrals and equipment to water service at street side of meter as shown on plans and as required by Code. Provide one (1) copper weld ground rod as required by Code in addition to water service ground. If water service not available, provide 2nd ground rod.

B. Service neutrals shall not be grounded except at the main service ground.

C. Provide a separate ground jumper across all flexible conduit connections.

D. A separate green ground wire shall be provided for flexible conduit connections to motors, equipment and fixtures.

E. Provide a ground wire separate from the neutrals for all light fixtures, outlets, device boxes, junction boxes, motors, and all other electrical equipment.

F. When utilizing EMT conduit for the raceway system a separate ground wire sized per NEC shall be pulled in with all power conductors.

G. When utilizing rigid conduit for the raceway system a separate ground wire sized per NEC shall be pulled in with all power conductors unless specified otherwise.

H. The grounding system shall meet all the requirements of the NEC and all state and local codes as required.

2.06 GENERAL LIGHTING AND POWER PANELBOARDS

A. Furnish and install circuit breaker lighting and power panelboard as shown on the drawing and as specified herein. See power riser and schedule for equipment sizes, voltage ratings, and quantities. Panelboards shall be equipped with thermal magnetic molded case circuit breakers with frame and trip ratings as shown on the schedules..

B. Square D, Westinghouse, G.E. or Cutler-Hammer equipment is acceptable. Shop drawings shall indicate fault current capabilities and all other ratings as specified. Tandem circuit breakers are not acceptable. Handle ties are not acceptable.

C. Circuit breakers shall be bolt-on thermal-magnetic, molded case circuit breakers. Breakers shall be 1, 2 or 3-pole with an integral crossbar to assure simultaneous opening of all poles in multiple circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON" and "TRIPPED" positions. Bolt-on circuit breakers shall be able to be installed in the panelboard without requiring additional mounting hardware.

D. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated 240 volts or 480 volts ac minimum with continuous current ratings as noted on the plans. Interrupting ratings shall be 10,000 rms symmetrical amperes minimum at 240 volts ac maximum and 14,000 rms symmetrical amperes minimum at 480 volt ac maximum. Single pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads on a regular basis shall carry the SWD marking.

E. Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67. Bus structure shall be insulated. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or phase sequence type and shall accept either plug-on or bolt-on circuit breakers. All current carrying parts of the bus parts of the bus structure shall be plated.

F. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Each front shall include a door and have a flush, cylinder tumbler-type lock with catch and spring-loaded stainless steel door pull. All panelboards locks shall be keyed alike. Doors shall be mounted with completely concealed steel hinges. Fronts shall not be removable with door in the locked position. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. Circuit directories

are to be properly filled in with a typewriter at completion of the job, with designations as determined by the Owner.

G. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or on the plans. This rating shall be established by testing with the overcurrent devices mounted in the panelboard. The short circuit tests on the overcurrent devices and on the panelboard structure shall be made simultaneously by connecting the fault to each overcurrent device with the panelboard connected to its rated voltage source. Method of testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying specified panelboard short circuit or greater. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.

H. Panelboards shall be listed by Underwriters Laboratories and bear the UL label. When required, panelboards shall be suitable for use as service equipment.

I. Panelboards shall be full height, full depth standard lighting and distribution type panels designed for commercial and industrial use. Load center type panelboards are not acceptable.

J. Main circuit breakers to be used as service entrance shall be service entrance rated as required.

K. Panel and feeders to be balanced within 10% under full load conditions.

L. Provide 3/4-inch plywood backup behind surface mounted panels and equipment where indicated on plans. Paint all two (2) coats gray enamel, both sides and all around.

2.07 MOTORS AND MOTORIZED EQUIPMENT INSTALLATION

A. All motors shall be furnished by equipment suppliers and shall be three-phase, 230V unless specifically indicated otherwise. All starters and motor controllers shall be by the Contractor unless specifically indicated otherwise.

B. The Contractor shall connect and test all motors for proper rotation.

C. The Contractor shall test each motor connected under load for applied voltage and current measurement and shall record these values and turn over this record to the Engineer.

D. The Contractor shall install overload heaters in all starters based upon the nameplate current on the motor.

E. The Contractor shall not connect any motor until he is certain that it is property protected. Replacement of any motor connected under this contract due to improper protection is the responsibility of the Contractor.

F. Electrical contractor shall consult with the HVAC, Mechanical, Process and Plumbing Contractors and their control subcontractors regarding motor controls and their respective wiring diagrams.

G. See drawings for motor locations, connections and control to be furnished by the Contractor.

2.08 MOTOR STARTERS (If Required)

A. Furnish and install starters as shown on the drawing and as specified herein. See power riser and schedule for type an number of units, equipment sizes, voltage ratings, and quantities.

B. Starters shall be manufactured by Westinghouse, Cutler-Hammer, Allen-Bradley, Square-D, G.E., Furnas, or approved equal.

C. All full voltage non-reversing starters shall be NEMA rated, 230 V, three-phase, 60Hz, electrically operated, electrically held with 120V holding coil. Starter shall be equipped with a 1-phase thermal overload relay with manual reset. Each starter shall be equipped with accessories as indicated on the schematics found on the drawings. Starter units shall be of the size indicated on the schedule.

D. Provide plastic laminated engraved labels for each starter unit. Identifications labels shall be as indicated on the schedules. Labels shall be black on white with 1/4" lettering minimum.

E. Motor starters can be combined with a disconnect to form a combination (fusible) starter unit.

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 16900
CONTROLS, INSTRUMENTATION AND TESTING

PART 1 GENERAL

1.01 ELECTRICAL TESTING

A. Work under this Section shall include performance of all tests necessary to satisfactorily show that all electrical systems and devices have been installed according to plans and specifications.

B. All electrical devices shall be operated at lest twice to insure satisfactory performance. All electrical motors connected under this contract shall be checked for proper rotation.

C. These tests shall be performed in the presence of the Engineer or owners representative.

D. Test all grounded outlets and equipment frames for proper grounding.

E. All motor shall be tested for rotation and proper heater size as specified in section 16400.

1.02 INSTRUCTION AND MANUALS

A. For each electrical system install a complete schematic diagram at the central control point for the respective system. In general, these schematics shall consist of, in part, the riser or systems drawings for the system contained in contract blueprint documents, together with appropriate shop drawings, operating and maintenance manuals: i.e., the power and lighting riser and shop drawings at the service equipment. Provide protective envelopes, appropriately marked and clipped in place for ready reference.

B. Instruct the Owner's representative in operation and maintenance of all electrical equipment. Furnish instruction and maintenance manuals for all electrical equipment.

C. For all new equipment installed, provide three (3) sets of wiring diagrams, schematics, operating and maintenance manuals.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

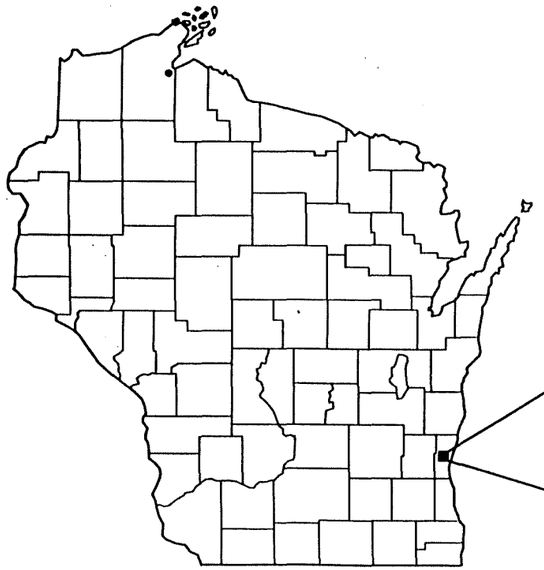
COOK COMPOSITES & POLYMERS CO.

SOIL REMEDIATION SYSTEM
CONSTRUCTION PLANS

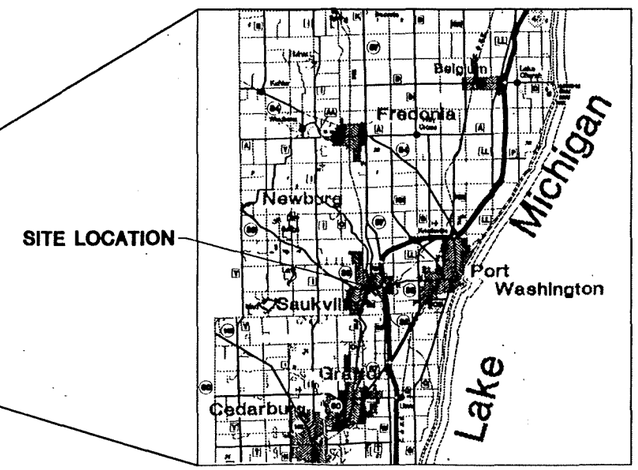
PREPARED FOR: COOK COMPOSITES & POLYMERS CO.
SAUKVILLE, WISCONSIN

PREPARED BY: RMT, INC.
MADISON, WISCONSIN

DATE: MARCH 1995



WISCONSIN



SITE
LOCATOR MAP

INDEX

NOTE: THIS PLAN SET IS ACCOMPANIED BY A SET OF SPECIFICATIONS OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER.

RMT, INC.
744 Heartland Trail
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444

PIPING SYMBOLS (1)

- PIPING
- JACKETED PIPING
- HOT WATER HEAT TRACED AND INSULATED PIPING
- STEAM HEAT TRACED AND INSULATED PIPING
- ELECTRIC HEAT TRACED AND INSULATED PIPING
- INSULATED PIPING
- FLANGED OR UNION CONNECTION
- THREADED OR WELDED CONNECTION
- FLANGE OR UNION
- 1/2 OF FLANGED OR UNION CONNECTION
- PIPE ENDED IN BLIND FLANGE
- PIPE ENDED IN THREADED CAP OR PLUG
- PIPE ENDED IN WELDED CAP OR PLUG
- HOSE BIB
- CONCENTRIC REDUCER OR REDUCING BUSHING
- ECCENTRIC REDUCER OR REDUCING BUSHING WITH FLAT SIDE UP
- ECCENTRIC REDUCER OR REDUCING BUSHING WITH FLAT SIDE DOWN
- VENT
- VENT WITH SCREEN
- PIPE TRAP
- PIPE WITH SPRAY NOZZLES
- PIPE WITH DIFFUSERS
- DRAIN
- SPEC XXXXX — SPEC YYYYY — PIPING SPECIFICATION CHANGE
- A — PIPING CONTINUATION THIS DRAWING
- B SHEET 2 OF 2 — PIPING CONTINUATION ANOTHER DRAWING

VALVE SYMBOLS (2)

- GATE VALVE
- GLOBE VALVE
- ANGLE VALVE
- BALL VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- DIAPHRAGM VALVE
- PINCH VALVE
- NEEDLE VALVE
- CHECK VALVE
- FLOAT OPERATED VALVE WITH FLOAT
- PRESSURE RELIEF VALVE
- VACUUM RELIEF VALVE
- PRESSURE REDUCING VALVE (SELF-CONTAINED)
- BACKPRESSURE VALVE (SELF-CONTAINED)
- 2-WAY SOLENOID VALVE
- 3-WAY SOLENOID VALVE
- QUICK-OPENING VALVE
- STOP CHECK VALVE

GENERAL SYMBOLS

- TIE-IN NEW TO EXISTING
- LINE OF SLOPE

TANK SYMBOLS

- VERTICAL TANK CONE TOP-FLAT BOTTOM
- VERTICAL TANK DISHED TOP-DISHED BOTTOM
- VERTICAL TANK DISHED TOP-FLAT BOTTOM
- VERTICAL TAN DISHED TOP-
- VERTICAL TAN FLAT TOP-C
- VERTICAL TAN FLAT TOP-D

PING, TUBING, AND DUCTING.
OLS ARE FOR VALVES WITH
RATORS, EXCEPT WHERE A
KNOWN WITH A HANDWHEEL
OR WITH AN AUTOMATIC

OM INSTRUMENT SOCIETY OF
NDARD ISA-S5.1-1984,
SYMBOLS AND IDENTIFICATION".

INSTRUMENT IDENTIFICATION CHART (3)

FIRST LETTER		SUCCEEDING LETTERS		
MEASURED OR INITIATING VARIABLE	MODIFIER TO FIRST LETTER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
ANALYSIS		ALARM		
BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
USER'S CHOICE			CONTROL	
USER'S CHOICE	DIFFERENTIAL			
VOLTAGE		SENSOR (PRIMARY ELEMENT)		
FLOW RATE	RATIO (FRACTION)			
USER'S CHOICE		GLASS, VIEWING DEVICE		
HAND				HIGH, OPEN
CURRENT (ELECTRICAL)		INDICATE		
POWER	SCAN			
TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL ERROR	
LEVEL		LIGHT		LOW, CLOSED
USER'S CHOICE	MOMENTARY			MIDDLE, INTERMEDIATE
USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
USER'S CHOICE				
PRESSURE, VACUUM				
QUANTITY	INTEGRATE, TOTALIZE			
RADIATION		RECORD		
SPEED, FREQUENCY	SAFETY		SWITCH	
TEMPERATURE			TRANSMIT	
MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
VIBRATION, MECHANICAL ANALYSIS				
WEIGHT, FORCE		WELL		
UNCLASSIFIED	X-AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
EVENT, STATE OR PRESENCE	Y-AXIS		RELAY, COMPUTE, CONVERT	
POSITION, DIMENSION	Z-AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

INSTRUMENT AND FUNCTION SYMBOLS (3)

	LOCALLY MOUNTED	MOUNTED ON PRIMARY PANEL		MOUNTED ON AUXILIARY PANEL	
		NORMALLY ACCESSIBLE TO OPERATOR	NORMALLY INACCESSIBLE TO OPERATOR	NORMALLY ACCESSIBLE TO OPERATOR	NORMALLY INACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS	(INSTLOC)	(INSTOUT)	(INSTIN)	(INSTREM)	(INSTBACK)
SHARED DISPLAY AND/OR SHARED CONTROL	(SHARLOC)	(SHAROUT)	(SHARIN)	(SHARREM)	(SHARBACK)
COMPUTER FUNCTION	(COMPLOC)	(COMPOUT)	(COMPIN)	(COMPREM)	(COMPBACK)
PROGRAMMABLE LOGIC CONTROL	(PLCLOC)	(PLCOUT)	(PLCIN)	(PLCREM)	(PLCBACK)

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: COOK COMPOSITES & POLYMERS CO.
SOIL REMEDIATION SYSTEM
SAUKVILLE, WI

SHEET TITLE: SYMBOL SHEET

DRAWN BY: SJB	SCALE: NOT TO SCALE	PROJ. NO. 1832.88 ,
CHECKED BY:	DATE PRINTED:	FILE NO. 18328804
APPROVED BY:		SHEET 2 OF 5
DATE: MARCH 1995		

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Madison, WI 53708-8923
Phone 608/831-4444

$$DW...
$$PRT$$
$$SCALE$$
$$DATE$$

PIPING SYMBOLS (1)

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VALVE SYMBOLS (2)

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- BACKPRESSURE VALVE (SELF-CONTAINED)
- 2-WAY SOLENOID VALVE
- 3-WAY SOLENOID VALVE
- QUICK-OPENING VALVE
- STOP CHECK VALVE

GENERAL SYMBOLS

- AAA — TIE-IN NEW TO EXISTING
- LINE OF SLOPE

SPECIALTY SYMBOLS

- Y-TYPE STRAINER
- TEMPORARY STRAINER
- DIAPHRAGM SEAL
- FLEXIBLE CONNECTOR
- SILENCER
- BAG FILTER
- CARTRIDGE FILTER
- EDUCTOR
- STATIC MIXER
- STATIC MIXER WITH INTEGRAL INJECTION PORT
- PITLESS ADAPTER
- AIR OR GAS FILTER
- SPECTACLE BLIND
- BLIND FLANGE
- RING SPACER
- BLEED RING
- RESTRICTION ORIFICE
- WATER HAMMER ARRESTOR
- PULSATION DAMPENER
- RUPTURE DISC
- MIXING TEE WITH INJECTION QUILL
- QUICK-CONNECT HOSE CONNECTION
- HOSE BARB
- FLEXIBLE HOSE
- FLEXIBLE HOSE WITH QUICK-CONNECT FITTINGS
- FLEXIBLE HOSE WITH THREADED ENDS
- CLAMPED CONNECTION (PIPE-TO-HOSE)
- CLAMPED CONNECTION (HOSE-TO-HOSE)

EQUIPMENT SYMBOLS

- HORIZONTAL CENTRIFUGAL PUMP
- M — SUMP PUMP
- VERTICAL CENTRIFUGAL PUMP
- SUBMERGED VERTICAL TURBINE PUMP WITH INTEGRAL MOTOR
- M
- AIR-OPERATED EJECTOR PUMP
- CENTRIFUGAL FAN
- CENTRIFUGAL BLOWER
- ROTARY BLOWER OR COMPRESSOR
- AIR STRIPPING UNIT (PACKED COLUMN TYPE)
- AIR STRIPPING UNIT (TRAY TYPE)
- M — ELECTRIC MOTOR

INSTRUMENT LINE SYMBOLS (3)

- INSTRUMENT OR ELECTRIC MOTOR CONNECTION TO PROCESS
- ELECTRIC SIGNAL
- ELECTRIC BINARY (ON-OFF) SIGNAL
- PNEUMATIC SIGNAL
- PNEUMATIC BINARY (ON-OFF) SIGNAL
- HYDRAULIC SIGNAL
- CAPILLARY TUBE
- ELECTROMAGNETIC OR SONIC SIGNAL (GUIDED)
- ELECTROMAGNETIC OR SONIC SIGNAL (NOT GUIDED) "SIGSON" SYMBOL W/O LINE
- INTERNAL SYSTEM LINK (SOFTWARE OR DATA LINK)
- MECHANICAL LINK
- A — INSTRUMENT LINE CONTINUATION THIS DRAWING
- B SHEET 2 OF 2 — INSTRUMENT LINE CONTINUATION ANOTHER DRAWING
- BUBBLE (SINGLE) WITH LEADER
- BUBBLE (DOUBLE) WITH LEADER

TAGGING SYMBOLS

- L-200 — LINE TAG (DEFAULT STYLE)
- L-AAAAB CCC* — LINE TAG - STYLE A
- L-AAAB CC* — LINE TAG - STYLE B
- CC* — LINE TAG - STYLE C
- SL-AAAB CCC* — LINE TAG - STYLE D
- S-200 — SPECIALTY TAG
- V-200 — VALVE TAG

INSTRUMENT PRIMARY ELEMENT SYMBOLS

FLOW ELEMENTS

- FLOW METER
- TURBINE OR PROPELLER TYPE
- MAG — MAGNETIC TYPE
- POSITIVE DISPLACEMENT TYPE
- SONIC (IN-LINE) TYPE
- VORTEX TYPE
- TARGET TYPE
- ANNUBAR OR AVERAGING PITOT TUBE
- ROTAMETER
- VANE TYPE
- FT — SONIC TYPE (OUTSIDE PIPE)
- FX
- FE — ORIFICE FLANGE

TEMPERATURE ELEMENTS

- TV — THERMOWELL

MISCELLANEOUS INSTRUMENT SYMBOLS

INSTRUMENT DESIGNATION

AAA — INSTRUMENT IDENTIFICATION
XXX — LOOP NUMBER (3 DIGITS)

DEFINITIONS OF ABBREVIATIONS

H-O-A	HAND-OFF-AUTOMATIC
ON-OFF	ON-OFF
O-A	OFF-AUTOMATIC

TANK SYMBOLS

- VERTICAL TANK CONE TOP-FLAT BOTTOM
- VERTICAL TANK DISHED TOP-DISHED BOTTOM
- VERTICAL TANK DISHED TOP-FLAT BOTTOM
- VERTICAL TANK DISHED TOP-SLOPED BOTTOM
- VERTICAL TANK FLAT TOP-CONE BOTTOM
- VERTICAL TANK FLAT TOP-DISHED BOTTOM
- VERTICAL TANK FLAT TOP-FLAT BOTTOM
- VERTICAL TANK FLAT TOP-SLOPED BOTTOM
- VERTICAL TANK OPEN TOP-CONE BOTTOM
- VERTICAL TANK OPEN TOP-DISHED BOTTOM
- VERTICAL TANK OPEN TOP-FLAT BOTTOM
- VERTICAL TANK OPEN TOP-SLOPED BOTTOM

INSTRUMENT IDENTIFICATION CHART (3)

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER TO FIRST LETTER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE			CONTROL	
D	USER'S CHOICE	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE		GLASS, VIEWING DEVICE		
H	HAND				HIGH, OPEN
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW, CLOSED
M	USER'S CHOICE	MOMENTARY			MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE				
P	PRESSURE, VACUUM				
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS				
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X-AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR FREQUENCY	Y-AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z-AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

INSTRUMENT AND FUNCTION SYMBOLS (3)

	LOCALLY MOUNTED	MOUNTED ON PRIMARY PANEL		MOUNTED ON AUXILIARY PANEL	
		NORMALLY ACCESSIBLE TO OPERATOR	NORMALLY INACCESSIBLE TO OPERATOR	NORMALLY ACCESSIBLE TO OPERATOR	NORMALLY INACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS	(INSTLOC)	(INSTOUT)	(INSTIN)	(INSTREM)	(INSTBACK)
SHARED DISPLAY AND/OR SHARED CONTROL	(SHARLOC)	(SHAROUT)	(SHARIN)	(SHARREM)	(SHARBACK)
COMPUTER FUNCTION	(COMPLOC)	(COMPOUT)	(COMPIN)	(COMPREM)	(COMPBACK)
PROGRAMMABLE LOGIC CONTROL	(PLCLOC)	(PLCOUT)	(PLCIN)	(PLCREM)	(PLCBACK)

NOTES:

(1) INCLUDES PIPING, TUBING, AND DUCTING.
(2) VALVE SYMBOLS ARE FOR VALVES WITH MANUAL OPERATORS, EXCEPT WHERE A VALVE IS SHOWN WITH A HANDWHEEL EXTENSION OR WITH AN AUTOMATIC OPERATOR.
(3) ADAPTED FROM INSTRUMENT SOCIETY OF AMERICA STANDARD ISA-S5.1-1984, "INSTRUMENT SYMBOLS AND IDENTIFICATION".

NO.	BY	DATE	REVISION	APP'D.
3.				
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1.				

PROJECT: COOK COMPOSITES & POLYMERS CO.
SOIL REMEDIATION SYSTEM
SAUKVILLE, WI

SHEET TITLE: SYMBOL SHEET

DRAWN BY: SUB	SCALE: NOT TO SCALE	PROJ. NO. 1832.88
CHECKED BY:		FILE NO. 183288804
APPROVED BY:	DATE PRINTED:	SHEET 2 OF 6
DATE: MARCH 1995		

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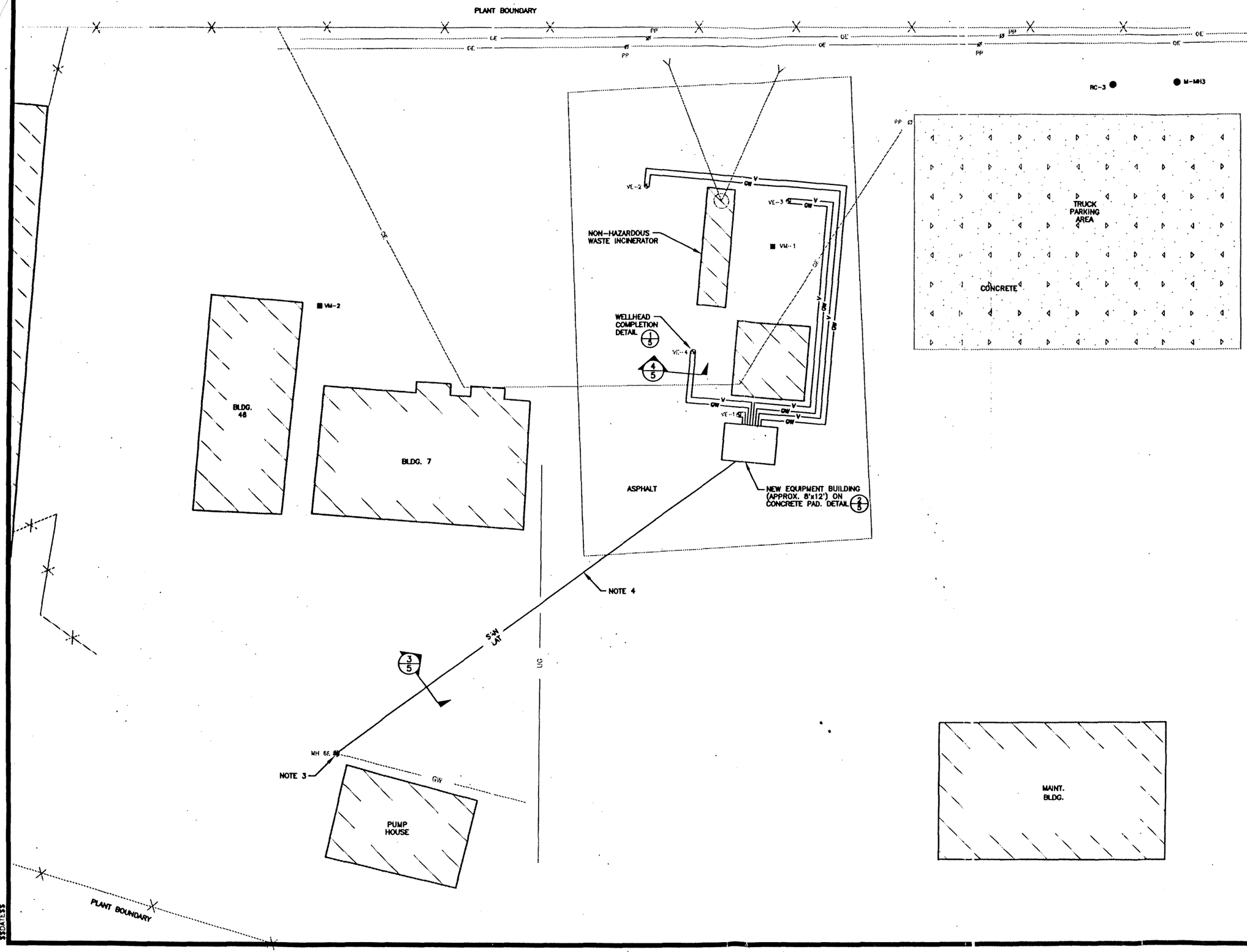
$$DATE$S



LEGEND

VE-1	EXISTING SOIL VAPOR EXTRACTION WELL
VM-1	EXISTING SOIL VAPOR MONITORING WELL
	OVERHEAD GUY WIRE
OE	OVERHEAD ELECTRIC
GW	EXISTING GROUNDWATER
UG	EXISTING UNDERGROUND NATURAL GAS
V	2" PVC, SCH 40 VAPOR EXTRACTION LINE
GW	1" PVC, SCH 80 GROUNDWATER RECOVERY LINE
SAN LAT	6" STL, SCH 40 SANITARY SEWER LATERAL

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE. ON-SITE UTILITIES AND BELOW GRADE PIPING ARE NOT SHOWN COMPLETE. CONTRACTOR SHALL VERIFY LOCATIONS BEFORE ANY WORK IS STARTED, AND SHALL EXERCISE CAUTION IN VICINITY OF EXISTING SYSTEMS.
2. CONTRACTOR SHALL NOTIFY AREA UTILITES IN ACCORDANCE WITH LOCAL REQUIREMENTS BEFORE COMMENCING WORK ON THIS PROJECT.
3. CONTRACTOR SHALL CORE DRILL EXISTING MANHOLE TO CONNECT NEW LATERAL. RESTORE WITH WATER-TIGHT GROUT SEAL.
4. EXCAVATION WILL CROSS MAIN PLANT ACCESS ROAD. CONTRACTOR SHALL COORDINATE TRENCHING WITH OWNERS REQUIREMENTS AND LIMIT THE AMOUNT OF OPEN TRENCH TO MAINTAIN TRUCK ACCESS TO PLANT.

0 10 20
SCALE: 1"=10'

SOURCE OF BASE MAP:
TRIAD ENGINEERING INC. DRAWINGS (D-256-0 THRU D-256-7) DATED 10-7-87.

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PROJECT: COOK COMPOSITES & POLYMERS CO.
SOIL REMEDIATION SYSTEM
SAUKVILLE, WI

SHEET TITLE:
SITE PLAN

DRAWN BY: MJB	SCALE: 1" = 10'	PROJ. NO. 1832.88
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DATE: MARCH 1988		

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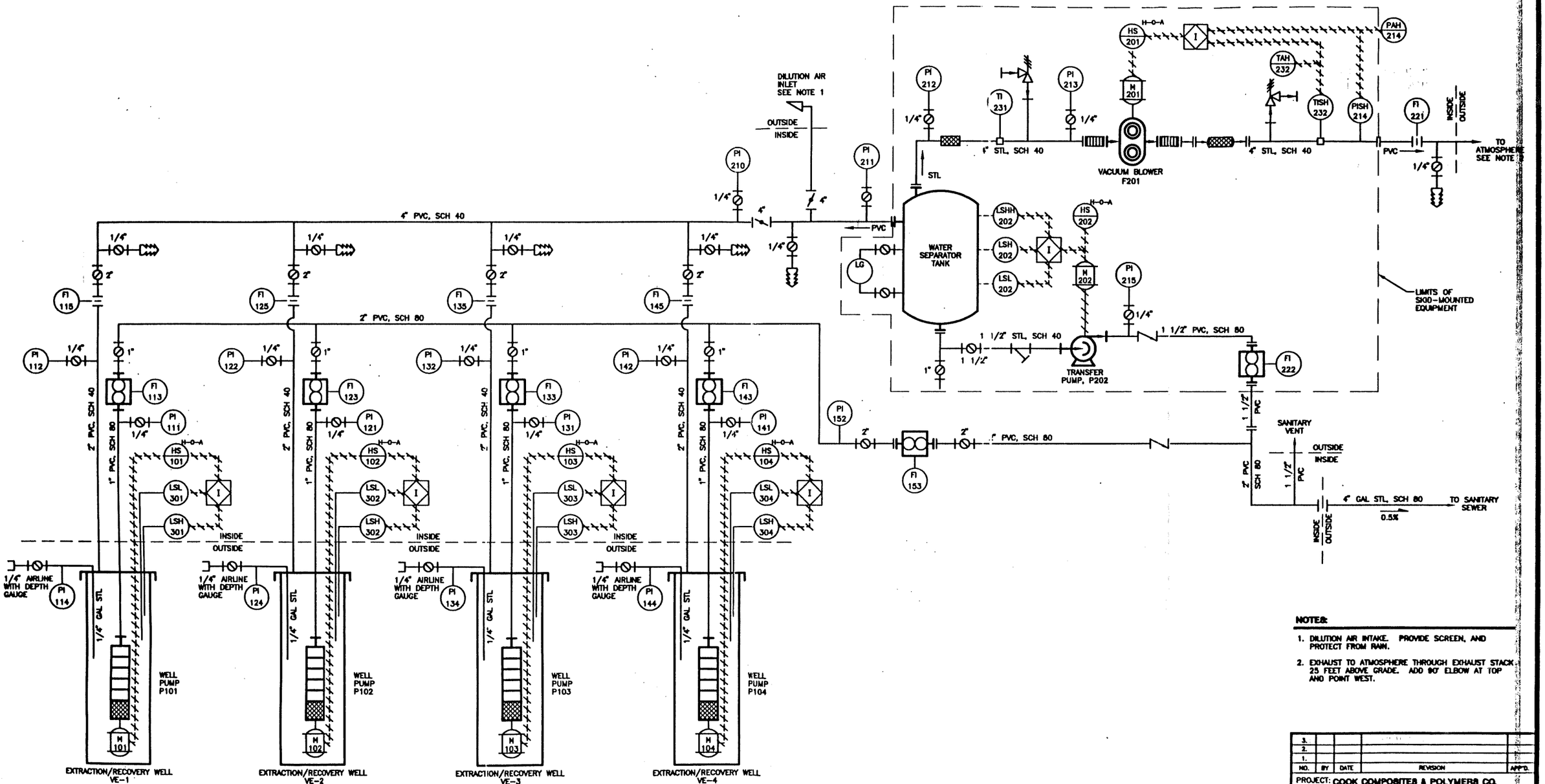
$$DATE$$



NOTES:

1. DILUTION AIR INTAKE. PROVIDE SCREEN, AND PROTECT FROM RAIN.
2. EXHAUST TO ATMOSPHERE THROUGH EXHAUST STACK 25 FEET ABOVE GRADE. ADD 90° ELBOW AT TOP AND POINT WEST.

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PROJECT: COOK COMPOSITES & POLYMERS CO.
SOIL REMEDIATION SYSTEM
SAUKVILLE, WI

SHEET TITLE:
PIPING AND INSTRUMENTATION DIAGRAM

DRAWN BY: SUB	SCALE: NOT TO SCALE	PROJ. NO. 1832.88
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APPROVED BY:		SHEET 4 OF 8
DATE: MARCH 1995		

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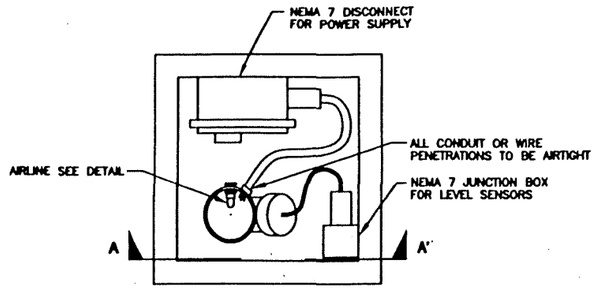
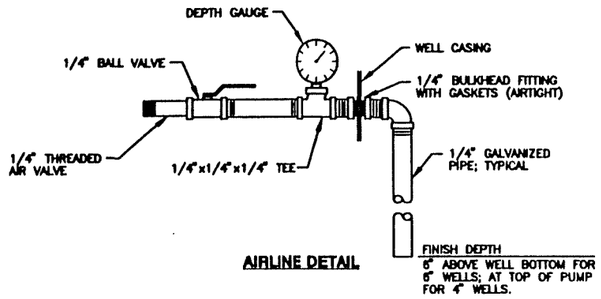
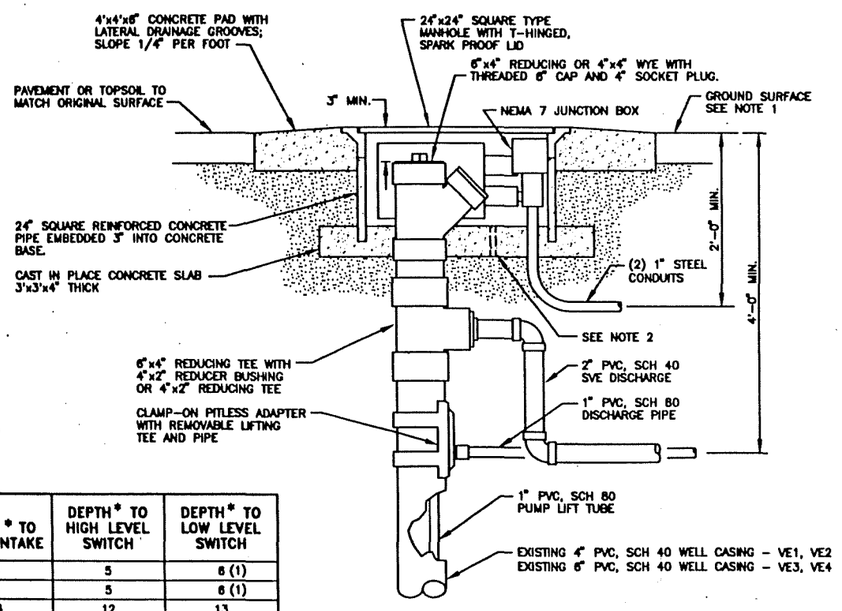
$$DATE$$





AIRLINE DETAIL

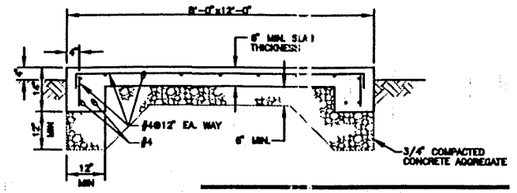


SECTION A-A'
INTERNAL CONDUIT AND WIRE RUNS NOT SHOWN

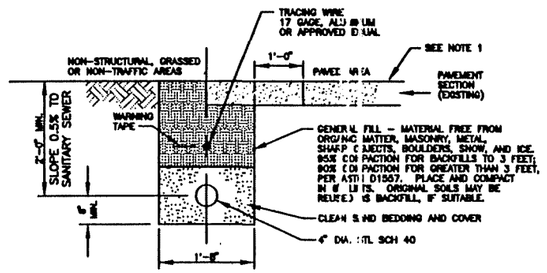
WELL NUMBER	DEPTH * TO PUMP INTAKE	DEPTH * TO HIGH LEVEL SWITCH	DEPTH * TO LOW LEVEL SWITCH
VE-1	7	5	6 (1)
VE-2	7	5	6 (1)
VE-3	14	12	13
VE-4	11	9	10

* DEPTH EXPRESSED AS "FEET BELOW ORIGINAL GRADE".
(1) OR AT TOP OF PUMP

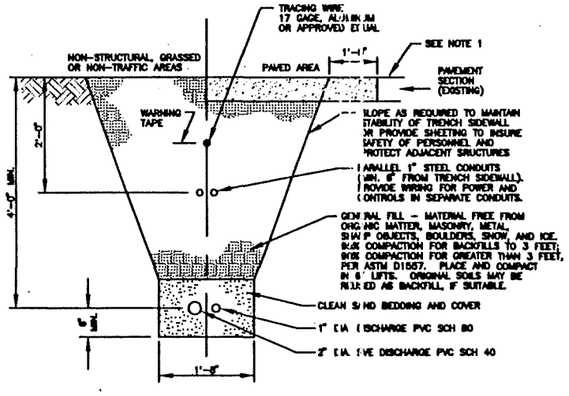
1/3 WELLHEAD COMPLETION, TYPE I EXTRACTION/RECOVERY WELL (VE)
(NOT TO SCALE)



2/3 FLOATING CONCRETE SLAB DETAIL
(NOT TO SCALE)



3/3 SANITARY LATERAL TRENCH DETAIL
(NOT TO SCALE)



4/3 UTILITY TRENCH DETAIL
(NOT TO SCALE)

NOTES:

1. FOR EXCAVATIONS IN AREAS WITH EXISTING PAVING, SAWCUT PAVEMENT 1' BEYOND EXCAVATION LIMITS. ALL PAVEMENT AND SURFACES SHALL BE RESTORED TO ORIGINAL CONDITION USING LIKE MATERIAL.
2. DRILL 2" DRAIN HOLE AND INSTALL REMOVABLE PLUG.

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PROJECT: COOK COMPOSITES & POLYMERS CO.
SOIL REMEDIATION SYSTEM
SAUKVILLE, WI

SHEET TITLE:
CIVIL DETAILS

DRAWN BY: WJB	SCALE: NOT TO SCALE	PROJ. NO. 1832.88
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APPROVED BY:	DATE PRINTED:	SHEET 5 OF 5
DATE: MARCH 1995		

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