WARZYN

Final
Phase II
Work Plan
13076

Remedial Investigation/ Feasibility Study Wausau Water Supply NPL Site Wausau, Wisconsin

Prepared for:

United States Environmental Protection Agency
Region V
Chicago, Illinois

Prepared by:

Warzyn Engineering Inc.
Madison, Wisconsin

June 1988

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Engineers & Scientists
Environmental Services
Waste Management
Water Resources
Site Development
Special Structures
Geotechnical Analysis

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HAZARDOUS WASTE MANAGEMENT

June 22, 1988
13076.22

Mr. Kevin Adler, RPM
Region V, U.S. EPA 5-HR-11
230 S. Dearborn
Chicago, IL 60604

Re: Phase II Work Plan Addendum
Wausau Water Supply NPL Site

Dear Kevin:

Warzyn is pleased to provide you with 4 copies of our Phase II Work Plan Addendum for the Wausau Water Supply NPL site. We are also sending four copies (2 Madison, 2 NCD) to the WDNR.

Please call if you have questions.

Sincerely,

WARZYN ENGINEERING INC.

Craig S. Rawlinson
Hydrogeologist

Dennis L. Iverson

Dennis L. Iverson, P.E.
Project Manager

DLI/jpl/DLI
[jpl-105-84]

Encl: As Stated

cc: WDNR

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Remedial Investigation/ Feasibility Study Wausau Water Supply NPL Site Wausau, Wisconsin

June 1988

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SECTION 1.0 INTRODUCTION

This work plan addendum describes the scope of activities proposed for the Phase II Investigation of the Wausau Water Supply NPL Site. Based on information obtained during the Phase I Field Investigation, the scope of the Phase II Investigation has been modified from the scope originally presented in Section 2.2 of the Approved Work Plan (Dated September, 1987). This Work Plan Addendum includes a general description of the Phase I Investigation results, an assessment of additional data requirements, and a task by task description of the project activities, anticipated costs, and schedule of completion.

1.1 SCOPE

The Phase I Investigation identified probable sources of Volatile Halogenated Hydrocarbons (VHHs) originating from the vicinity of the former City landfill, Bos Creek, and the Wausau Chemical Company. In addition, possible sources were also identified (based on soil gas survey results and soil sample analyses) from the C.M. St. P. & P. railroad right-of-way and the northern portion of Wausau Energy Company. The distribution of VHHs within the aquifer has also been tentatively identified, based on groundwater sampling of existing wells, and groundwater sampling and field analyses conducted during drilling.

The major goals and objectives of the Phase II investigation include:

- Characterization of source areas at a level of detail sufficient for assessment of associated health risks and evaluation of remedial alternatives;
- Field test enhanced soil ventilation as a potential remedial alternative for VHH source areas at Wausau Chemical and the former City landfill;
- Provide additional support for groundwater and surface water quality results obtained during the Phase I investigations;

- Identification of temporal variations in VHH impact of groundwater and surface water;
- Complete groundwater flow and contaminant transport model calibrations so that the model may be used to evaluate remedial alternatives during the feasibility study;
- Obtain treatment system performance data for Wausau Chemical and City of Wausau air strippers; and
- Obtain additional groundwater elevation data and Bos Creek flow data in order to assess the influence of induced surface water recharge on groundwater flow in the vicinity of Bos Creek.

1.2 SUMMARY OF PHASE I INVESTIGATION RESULTS

Based on the results of the Phase I Investigation, several probable sources of volatile halogenated hydrocarbon (VHH) contamination in the City production wells have been tentatively identified. The distribution of these compounds in the aquifer have also been generally delineated. The Phase I Remedial Investigation Technical Memorandum prepared by Warzyn Engineering Inc., dated April 1988, provides a description of VHH occurrences in the aquifer, and groundwater flow conditions in the vicinity of the City production wells. In general, the results of the Phase I Investigation may be summarized as follows:

- Production well pumpage exerts considerable influence on groundwater flow in the vicinity of the City well field. The production well pumpage has caused induced recharge of surface water into the aquifer from the Wisconsin River and Bos Creek. The zone of influence of the East Well Field appears to extend beyond the Wisconsin River and is affecting flow on the west side of the Wisconsin River.
- The radius of influence of the West Well Field at the water table extends at least as far south as Bos Creek and may have extended further south prior to production well CW6 being pumped to waste into the creek. The zone of influence near the base of the aquifer may presently extend further south possibly encompassing the northern portion of the former City landfill.
- The distribution of TCE in the aquifer south of Production Well CW6 appears to indicate two sources of contamination. The TCE plume in the deeper portion of the aquifer appears to originate from the location of the former City landfill. The shallow TCE plume appears the result of groundwater recharge of contaminated water from Production Well CW6 being pumped to waste into Bos Creek.

- The relatively continuous concentration of TCE observed in Production Well CW3 since early 1982, appears to be the result of TCE migration from the location of the former City Landfill, located on the west side of the Wisconsin River. The TCE plume is shown to migrate to the east under the river and is present at the base of the aquifer on the east side of the river.

- Elevated TCE concentrations at soil gas stations located in the northern portion of the former City landfill, TCE detected in soil samples obtained from boring W54 (located within the landfill) and TCE detected in the shallow aquifer beneath the former landfill appear to indicate it is a probable TCE source area.

- Elevated PCE concentrations were detected in soil gas samples obtained from several locations within the East Well Field including: the south side of Wausau Chemical, the northwest loading dock at Wausau Chemical, Wausau Energy, the C.M. St P. & P. Railroad, and Camelot Cleaners.

- The distribution of VHHs at the water table in the vicinity of the East Well Field indicate two chemically distinct shallow aquifer contaminant plumes. A plume composed predominantly of PCE was observed directly southwest of production well CW3, centered around Monitoring Well GM9S (Wergin Construction). PCE concentrations in excess of 5000 ug/L were detected in Monitoring Well GM9S during November 1987. A second plume was observed in the vicinity of Monitoring Well WC2 (east of Wausau Chemical). Elevated concentrations of PCE,; TCE; 1,2 DCE; and vinyl chloride were detected in groundwater samples obtained from water table monitoring wells located in this area.

1.3 ADDITIONAL DATA REQUIREMENTS

Further investigations are proposed to characterize potential source areas at the former City landfill, Wausau Chemical, Wausau Energy, Marathon Electric and the C.M. St. P. & P. Railroad-right-of-way. Additional soil borings will be used to characterize unsaturated zone soil contamination identified during previous investigations. This information will be used to evaluate potential remedial alternatives and to assess potential health risks. Additional sampling of groundwater and surface water will be required to verify Round 2 sampling results at recently installed wells and to determine temporal variations in groundwater and surface water quality. Monitoring of the air strippers is necessary to provide performance data of documentable quality for use in process analysis and prediction of process performance under alternative remedial action scenarios (including operational modifications).

Groundwater flow and transport modeling will be continued in order to complete the calibration of the models to observed contaminant transport from the former City landfill and Wausau Chemical sources. The calibrated groundwater model will be used to evaluate contaminant transport from suspected VHH source areas through time for use in the Endangerment Assessment. The calibrated groundwater model will also be used to evaluate proposed remedial actions during the feasibility study.

A detailed drawdown test is necessary to conclusively demonstrate hydraulic connection between suspected source areas and municipal production wells CW3 and CW6. In addition to drawdown measurement of the monitoring well network, water levels should also be monitored on Bos Creek in order to assess the effect of induced surface water recharge on groundwater flow beneath the creek.

SECTION 2.0 - PROPOSED PHASE II WORK PLAN

Based on data gaps identified during the Phase I investigation, the following Phase II activities are proposed:

2.1 TASK 1 - CONTINUED GROUNDWATER FLOW AND TRANSPORT MODELING

Groundwater flow and contaminant transport modeling will be continued during the Phase II investigation. The objectives of the continued groundwater flow and contaminant transport modeling include:

- Evaluation of contaminant transport from suspected VHH source areas through time;
- Evaluation of factors affecting groundwater flow and contaminant transport (i.e. influence of Bos Creek recharge on contaminant transport from the former City landfill);
- Calibrate groundwater flow and transport models for use in evaluating the remedial action alternatives during the feasibility study;
- Assessment of existing remedial actions (i.e. Wausau Chemical extraction system); and
- Provide enforcement support.

To achieve the modeling objectives the following subtasks are anticipated:

Task 1.1 Groundwater Flow Model Adjustments

Based on preliminary model results, additional flow model calibration is required. At least three areas requiring modifications have been identified. The observed groundwater levels at Monitoring Wells GM4D, GM4S and the Plum Drive Test Well are generally higher than model simulated levels at these wells. A possible explanation for this discordance may be increased groundwater recharge due to sand and gravel excavations north of Campus Drive. In order to improve model calibration, groundwater recharge rates will be increased in the vicinity of the excavations.

Further flow model calibration is also required in the vicinity of Monitoring Well R2D. Bos Creek flow measurements (see Task 2.6) will be used to estimate the induced recharge from the creek into the aquifer. This information may indicate model adjustments which will improve the model calibration in the vicinity of Monitoring Well R2D.

Finally, the groundwater flow model south of Production Well CW4 requires that stream bed leakance (River Bed Hydraulic Conductivity) be adjusted. Comparison of observed and simulated water levels at monitoring wells WGS9 and WGS10 indicate simulated water levels are generally greater than the observed levels. Adjustment of parameters used in the Phase I Technical Memorandum simulation will be conducted within measured ranges to improve the calibration in this area.

Subtask 1.2 Contaminant Transport Model Calibration

The contaminant transport model will be calibrated, in general, to observed conditions. The contaminant mass per unit area will be computed from VHH concentrations observed in groundwater samples collected during Round 2 sampling (December, 1987). The source particle release rate and particle mass will be adjusted over one memory period (the residence time of a tracked particle from source to sink) until the distribution of particles in the system approximately matches the mass per unit area distribution determined from the Round 2 groundwater sampling. The groundwater flow field will be defined from the transient groundwater flow model run for the memory period prior to the Round 2 sampling. Values for contaminant dispersion and release rates will be determined through calibration of the model to existing conditions utilizing general information where available. Given the state-of-the-art in contaminant transport modeling, and unknown release rates, calibration of the contaminant transport model may be very general in nature.

Before the contaminant transport model can be calibrated, the groundwater flow model will have to be extended to include time steps through December, 1987. If preliminary modeling indicates that the system memory period exceeds the current model start date (January 1976) the model will be extended back to include pumping records prior to January 1976.

Subtask 1.3 Contaminant Transport Modeling

Once the contaminant transport model is calibrated, probable source areas including Wausau Chemical and the former City landfill will be evaluated to determine the fate of VHH contamination through time. This will be used in the endangerment assessment to evaluate future potential exposure risks. The contaminant transport model will also be used to evaluate potential remedial alternatives in the Feasibility Study.

Remedial alternative evaluation may require substantial redesign of the finite difference model grid in order to obtain sufficient resolution in the vicinity of source areas. The redesigned grid would permit greater model accuracy for simulation of remedial actions limited to suspected source areas.

2.2 TASK 2 FIELD INVESTIGATIONS

Further characterization of probable source areas identified during the Phase I Investigation is needed to determine the distribution of contaminants within the source areas. The field investigation and tests will be used to assess potential remedial alternatives. The following field investigation activities are planned for Phase II.

Subtask 2.1 Soil Gas Survey/Soil Boring Investigation

The Phase I soil gas survey, soil sampling and water quality sampling were used to identify potential source areas. The Phase II soil gas survey and soil boring investigation is designed to further characterize these potential source areas. The soil gas data will be used qualitatively as a field

screening tool to determine which soil samples should be submitted for contract laboratory analysis and to identify locations where test pit excavations are required during Subtask 2.3.

The soil gas survey/soil borings will be conducted at the following thirty (30) locations:

- Wausau Chemical northwest loading dock - (3)
- Wausau Energy - (3)
- Wausau Chemical south side - (4)
- C. M. St. P. & P. Railroad right of way - (2)
- Former City of Wausau landfill - (12)
- Marathon Electric - (4)

An additional 2 soil boring locations will be determined based on results of the soil gas survey and analyses of soil samples. Refer to Figures 1 and 2 for proposed soil boring locations. Proposed soil boring depths, number of soil gas samples and boring rationale are presented in Table 1.

Soil gas samples will be collected through 4 1/4 inch hollow stem augers at selected depth increments. Drill rod fitted with lateral sampling ports will be driven two to three feet past the end of the augers. After the sampling probe has been driven to the desired depth, the drive head will be removed and a sampling adaptor will be threaded on to the drill rod. The soil gas sample will be collected in a 250 ml bomb, after purging a minimum of two sample device volumes using a portable air sampling pump. The sample bomb will be wrapped in aluminum foil, to minimize photoalteration and will be transported to the on-site GC. A sample blank and duplicate will be analyzed every 10 samples. Sample analysis will be conducted according to methods described in Appendix F of the approved QAPP (Dated September, 1987).

Decontamination will consist of purging more than 10 volumes of ambient air through the sampling device and brushing soil off the sampling probe and the lead auger. The split spoon will be cleaned between samples by washing with a laboratory wash solution (liquinox) and rinsing with clean water. The soil gas sampling probe and hollow stem auger will be steam cleaned prior to starting the investigation and between soil boring locations where residual materials are encountered.

East Study Area

Soil borings performed at Wausau Chemical, Wausau Energy, and the C.M. St. P.& P. Railroad right-of-way (Refer to Figure 1) will be approximately 15 feet deep. Soil samples will be collected according to ASTM D-1586 (standard penetration test). The samples will be obtained at 5 foot intervals using a 3 inch diameter split spoon. Samples undergoing VOC analyses will be transferred immediately to an 8 oz. VOC vial without compositing. Additional soil samples will be collected from locations where HNu screening of auger cuttings and/or visual observations indicate residual soil contamination. Soil samples will be screened for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID). Selected samples will be submitted to the CLP for fast turnaround VOC, metals, cyanide, base/neutral and acid extractable analyses using Special Analytical Services (SAS).

Approximately 4 groundwater samples (3 samples + 1 duplicate) will be collected from soil borings performed in the vicinity of Wausau Chemical northwest loading dock. The groundwater samples will be used to assess potential impact from the February 1983 PCE release. The groundwater samples will be collected at the water table through a screened lead auger. The samples will be obtained using either a stainless steel bailer or a Brainard Kilman hand pump. A minimum of three auger volumes will be purged prior to sample collection. Groundwater samples will be analyzed using the on-site GC according to methods described in Appendix F of the approved Quality Assurance Project Plan (QAPP), dated September, 1987. The groundwater samples will also be submitted to the CLP for VOC analyses using fast turnaround low detection GC/MS through SAS (see SAS request Appendix B of the QAPP Addendum).

Soil gas samples will be collected from borings performed at Wausau Chemical, Wausau Energy and the C.M. St. P.&P. railroad right-of-way. The soil gas samples collected during drilling will be used to assess the vertical soil gas concentration gradients within the soils. The soil gas sampling will also be used as a screening tool to determine which soil samples should be submitted to the CLP for analyses. The soil gas results in combination with the soil analyses will be used to differentiate source areas from areas containing soils that have been impacted by the migration of contaminated groundwater. The soil gas samples will be collected at 5 foot intervals above the water table. Three (3) permanent gas monitoring probes will be installed at the former bulk solvent storage area (south side of Wausau Chemical). The probes will be screened from the water table (±12 feet) to approximately three feet below ground surface. The gas extraction well will be screened directly above the water table and will have a screen length of approximately 3 feet. The gas probes and extraction well will be used during the soil gas extraction test (Subtask 2.2).

West Study Area

The soil gas survey/soil boring investigations will also be performed at the former City landfill and at selected locations surrounding the Marathon Electric assembly building. The results of the boring/soil gas investigation at the former City landfill will be used to determine test pit locations (Subtask 2.3) and design a soil vapor extraction test (Subtask 2.2). A total of twelve soil gas survey/soil sampling borings are anticipated within the limits of fill of the former landfill. Four soil borings will be performed along the perimeter of the Marathon Electric assembly building. The boring locations at Marthon Electric were selected based on the soil gas survey results and on additional data obtained from the Marathon Electric Company. The soil borings at Marathon Electric will be used to characterize potential VHH contamination in the unsaturated zone. Additional borings (maximum of 2) may be performed if the soil gas survey or the soil sample results indicate the need for further investigation. Proposed soil boring locations within the west study area are shown in Figure 2. Estimated boring depths, anticipated number of soil gas samples and boring rationale are presented in Table 1.

Soil samples will be collected at 5 foot intervals from ground surface to the completion depth. Soil samples will be collected according to procedures specified for the East Study Area. If soil samples cannot be collected due to split spoon obstruction, samples may be obtained from the auger cuttings. The soil samples will be screened for VOCs using a PID. Approximately twenty (28) soil samples collected from both east and west study area soil borings will be submitted to the CLP for fast turnaround (SAS) VOC, metals., cyanide, base/neutral and acid extractable analyses. Approximately two (2) groundwater samples will be collected through screened hollow stem augers at borings performed in the former City Landfill. An additional four (4) groundwater samples will be collected from borings performed along the perimeter of the Marathon Electric assembly building. The groundwater samples will be analyzed for target VOCs using the field GC. The groundwater samples will also be submitted to the CLP for verification of VOC results using fast turnaround low detection SAS methods. Refer to Table 2 for a summary of proposed sample numbers and analysis parameters.

The soil gas samples will be collected at five foot intervals from the ground surface to a depth of 10 foot, and at 10 foot intervals from 10 foot to boring completion (i.e., 5 ft, 10 ft, 20 ft, 30 ft). Soil gas samples will be collected according to the methods described in Section 2.2.1. Soil gas results will be used for field screening. Results will be presented in the remedial investigation report as estimated values and tentatively identified compounds. The results will not be used to formulate final conclusions concerning possible source areas. Approximately twelve (12) permanent gas monitoring probes will be installed at six locations (Refer to Subtask 2.2 for gas probe installation descriptions). Approximate gas probe installation locations at the former landfill are presented in Figure 2.

Costs

To develop costs for the Phase II soil gas survey/soil sampling program, the following assumptions were used:

- Approximately 72 soil gas samples, 112 soil samples and 10 screened hollow stem auger groundwater samples will be collected over a eight (8) day period using two drilling rigs;
- The eleven (9 samples, 1 duplicate, 1 blank) groundwater samples will be analyzed on site by the field GC and will be submitted to the CLP for VOC analyses by GC/MS (SAS);
- Approximately 560 feet of sampled hollow stem auger drilling will be required to complete the task;
- Two geologists will be required for eight (8) days to supervise drilling and sample collection;
- 90% level D and 10% level C protection will be required for sample collection and drilling. The geologists supervising drilling activities will monitor each drilling rig operation with an HNu for site safety;
- A field GC and operator will be required for eight (8) days to analyze groundwater and soil gas samples for target VOCs. An additional two days will be required to set up and calibrate the field GC;
- Approximately 86 soil gas samples (72 samples, 7 duplicate samples and 7 blanks), and 11 groundwater samples (9 samples, 1 duplicate sample and 1 blank) will be analyzed by the field GC; and
- Twenty soil samples will be submitted to the CLP for fast turnaround VOC, metals, cyanide, base/neutral and acid extractable analyses (SAS).

Refer to Appendix A for an itemized description of Subtask 2.1 costs.

Subtask 2.2 Soil Gas Extraction Treatability Study

Soil gas extraction tests will be conducted at the south side of Wausau Chemical and at the former city landfill located south of Marathon Electric Assembly building. The gas extraction tests will be used to evaluate the effectiveness of in-situ enhanced volatilization (soil venting) as a potential remedial alternative. The technique is based on the principal that volatile organic compounds (VOCs) will vaporize to a state of equilibrium in the air

space between soil particles. If the soil gas is static (not influenced by pumping), the vapors will diffuse slowly outward to lower concentration areas. Soil venting actively draws air through the soil, drawing clean air into the soil. VOCs in the soil moisture or adsorbed onto solids can then volatilize and be removed by the soil venting system.

Based on the presence of relatively high soil gas concentrations (Refer to Phase I Technical Memorandum), enhanced volatilization appears to be a potential remedial alternative for the treatment of unsaturated zone contamination at Wausau Chemical and the former City landfill. The gas extraction tests at these locations will be used to determine the radius of influence of the extraction system and to estimate the potential rate of removal of Volatile Halogenated Hydrocarbon (VHH) compounds from contaminated soils. The data acquired from the extraction test will be used to support development and evaluation of remedial alternatives.

The gas extraction tests will require the installation of several gas monitoring probes at the former City landfill and at the former Wausau Chemical bulk solvent storage area. Based on Phase I soil gas results, tentative gas probe locations have been identified (Figures 1 and 2). The exact probe locations and depths will be determined from Phase II soil gas results. The soil gas probes will be installed in the borings performed during the soil boring/soil gas sampling investigation (Subtask 2.1).

The installation of approximately sixteen (16) gas probes is anticipated (12 at the former City landfill and four at Wausau Chemical). Due to greater unsaturated zone thickness at the former City landfill (approximately 30 ft), the twelve (12) gas monitoring wells will be nested at approximately six (6) locations. The gas monitoring probes will be installed through a 4-1/4 inch hollow stem auger. If necessary, the shallow soil borings ($\lesssim$ 20 ft) will be left open until field GC data is available to select the screen position. The soil gas monitoring probe installation diagrams for single probe and multiple probe nests are shown in Figures 3 and 4, respectively. The probes will

consist of 3/4-inch Schedule 40 PVC with threaded couplings. The screened interval will be determined in the field and pipes will be either perforated using a power drill or slotted using a hack saw. The screened interval will be backfilled with 3/8-inch washed stone and a granular bentonite seal will be placed over the gravel pack. A protective flush mount surface casing will be placed over the completed gas probes which are located in high traffic areas (i.e. Marathon Electric parking lot).

Gas extraction wells will be installed at the former City landfill and Wausau Chemical (Refer to Figures 1 and 2 for approximate locations). The exact extraction well locations, depths and screen length will be determined based on soil gas and soil analyses results. The extraction wells will be installed using a 4-1/4" hollow stem auger. The extraction wells will be constructed of 2-inch ID Schedule 40 PVC with threaded couplings. The screen will be backfilled with 3/8-inch washed stone and a granular bentonite seal will be placed above the pea gravel. The remainder of the annular space will be backfilled with granular bentonite. The conceptual extraction well design is presented in Figure 5.

The gas extraction tests will require approximately four (4) days to complete (2 days at each location). Prior to system start up the gas probes and extraction wells will be monitored for static pressure, VOC levels, methane levels and oxygen levels. The samples will be collected from a sampling port through the PVC riser. The VOC samples will be collected in a 250 ml bomb according to methods described in the soil gas investigation (Refer to Section 2.1.5 Final Work Plan). The VOC samples will be analyzed using the on-site GC. The oxygen and methane levels will be measured at the gas probe using a Gastech Model 1939 OX gas analyzer. The pressure measurements will be conducted using Dwyer Magnehelic pressure gages. The static (non-pumping) pressure measurements will be assumed to be indicative of background conditions and will be used to determine relative pressure deviations at the extraction well and gas probes during the system start up and testing. Barometric pressure will be recorded before and during the extraction test so that appropriate corrections can be made if necessary.

The gas extraction test will be conducted by inducing a negative pressure at the test well using a 600 Watt, 2.6 Amp EG&G Rotron regenerative blower (model #DR353BT72). The extraction tests will be used to determine the minimum gas flow rate and well head pressure needed at the gas extraction well to influence the desired area or to influence the maximum area possible without excessive induced air inflow into the soils. The extraction tests will be initiated at predetermined test well valve settings and extraction velocities. The oxygen, methane, VOC levels and wellhead pressure will be recorded periodically until an equilibrium is established at the test well (constant wellhead pressure). Once equilibrium is established at the test well, pressure measurements will be conducted at adjacent gas probes to determine if the negative pressure induced at the test well is also influencing the adjacent monitoring points (decreasing the static pressure relative to background pressures). If the desired area of influence is not obtained by the initial extraction well settings, the valve apertures and velocities will be adjusted. Wellhead pressure, oxygen, methane, and VOC levels will be monitored to determine if excessive induced airflow into the soils is occurring. The extraction tests will be terminated when either the desired area has been influenced or the maximum zone of influence has been obtained. Gas velocities will be measured during the test using an Alnor Model 6006AP velometer. The gas flow rate for the test wells will be calculated from the gas velocity measurements. The flow rate and VHH concentrations will be used to estimate the mass of contaminants removed from the unsaturated zone during the test.

Costs

To develop costs for the gas extraction test program the following assumptions were used:

- Approximately 320 feet of gas probe and 40 feet of extraction well will be installed in borings performed during Subtask 2.1;
- A professional (Engineer/Geologist) and a technician will require approximately 4 days to complete the task;

- A portable generator and eductor blower will be required for 4 days;
- A Gastech Model 1939-ox gas analyzer and an Alnor Model 6006AP velometer will be required for 4 days.
- A field GC and operator will be required for the 4 day test period (cost to be split with test pit excavation program, Subtask 2.3).

Refer to Appendix A for an itemized description of Subtask 2.2 costs.

SUBTASK 2.3 FORMER CITY LANDFILL TEST PIT INVESTIGATION

Backhoe test pit excavations will be conducted at a maximum of eight (8) locations within the former City landfill. Five of the test pit excavation locations are shown in Figure 2. The proposed test pit locations are approximate, based on data obtained during Phase I including: soil gas survey results, presence of VHHs in unsaturated zone soils obtained from the landfill and interviews conducted with former landfill employees. The exact test pit locations will be determined based on review of the Phase II soil gas survey results and PID screening of soil samples obtained during the Phase II boring program. If needed, an additional three test pit locations will be selected based on the Phase II soil borings, soil gas sampling (Subtask 2.2) and based on materials encountered in the first five test pits.

The test pit excavations will be used to characterize the source of VHH contamination within the former City landfill. Source characterization will include field classification of the landfill cover materials, waste materials and fill materials. Approximately, fifty (50) soil/waste samples will be collected from the test pit excavations. The soil samples will be analyzed using a photoionization detector (PID). Twenty (20) duplicate soil samples will be submitted to the CLP for analysis of VOCs and U.S. EPA Target Compound List (TCL) parameters. Refer to Table 2 for a summary of the sampling and analysis program. The CLP VOC analyses of soil samples will be used to quantify field PID screening results. The TCL parameter analyses will be used to identify additional compounds which may be present at the source area.

The test pit excavations will be performed with a backhoe to an approximate depth of 15 feet. Test pit excavations are anticipated to be approximately 15 feet long and 5 feet wide. However, the excavation may be enlarged to characterize residual materials encountered. Fill and waste materials removed during the excavation will be stockpiled and used to refill the excavation following sampling (Refer to Appendix B). If drummed wastes are encountered during the excavations the wastes will be sampled and submitted for CLP analysis of TCL organics and inorganics. If possible the containerized wastes will be sampled in place without removal from the excavation. However, if the containerized waste cannot be sampled in-situ, without endangering field personnel, the waste will be excavated and sampled. Containerized (drummed) wastes will be placed back in the test pits unless the integrity of the container has been compromised. Containers which become breached during the excavation will be overpacked and stored in a secured location. Each test pit excavation will be documented using photographs and video/audio recording.

Samples of excavated fill materials will be collected out of the backhoe bucket using stainless steel spatulas or trowels. Samples submitted for VOC analyses will be placed directly into the sampling bottle without compositing. Base neutral and acid extractable samples will be composited in a stainless steel mixing bowl before being placed in sample jars. If containerized wastes are encountered in the excavations, the contents will be sampled using a glass pipe (liquid) or a sediment sampler (sludge).

The test pit investigation area will be returned to its approximate previous state (bituminous pavement or vegetated) following completion of the test pit excavation program.

Costs

To develop costs for the test pit excavation program, the following assumptions were used:

- A total of eight (8) test pits will be conducted in three (3) days requiring a supervising geologist and a health and safety officer;
- Backhoe subcontractor costs including: mobilization, labor, excavation equipment, health and safety equipment (Level B), decontamination equipment and associated costs will total approximately $8,600.

- Warzyn will provide its employees with health and safety protective equipment (Level B for 3 days) and monitoring devices (HNu and HCN meter).
- A field GC and operator will be required for three (3) days.
- Restoration of the site including landscaping and paving will be the responsibility of the excavation contractor.

Refer to Appendix A for an itemized description of Subtask 2.3 costs.

SUBTASK 2.4 ROUND 3 GROUNDWATER SAMPLING

Round 3 groundwater samples will be collected at ninety (90) locations in order to augment sample analysis results obtained from Round I (Subtask 2.1.4) and Round 2 (Subtask 2.1.8) sampling. The primary purpose for this round is to obtain a second sample and analysis from wells installed during Phase I to confirm the observations of contaminant distribution from Phase I sampling. The samples will also provide additional information pertaining to source area characterization, extent of contamination, temporal groundwater quality variations and mass of contaminants present. Samples of Wausau Chemical and City of Wausau air stripper influent and effluent will be collected in order to provide performance data of documentable quality. This information will aid in the evaluation of remedial alternatives. The samples will be collected from the following locations:

- Five (5) City production wells;
- Thirty (30) monitoring wells installed during Subtask (2.1.6);
- Five (5) Wausau Chemical Extraction wells (preferably pumping);
- Wausau Chemical treatment system influent and effluent (2 samples of each, 4 total);
- City of Wausau air stripper influent and effluent (2 samples of each from both strippers, 8 total);
- Thirty-five (35) previously existing monitoring wells; and
- Three (3) recently installed Marathon Electric monitoring wells which were not sampled during the Phase I investigation.

The groundwater sampling methods, equipment and decontamination procedures are the same as those summarized in Section 2.1.8 of the approved work plan (dated September 1987). The ninety (90) groundwater samples will be analyzed for VOCs using fast turnaround low level GC/MS through SAS. An additional twenty-three (23) samples collected from potential source areas and impacted production wells (CW3, CW4, CW6) will be submitted to the CLP for fast turnaround TCL analyses by SAS. Refer to Table 2 for a summary of the sampling and analysis program. Sample locations are presented in Figure 6.

Costs

To develop costs for the groundwater quality monitoring program, the following assumptions were used:

- Water quality sampling will require five persons. Two teams of two people will collect the samples, one person will be responsible for sample documentation and sample shipment;
- Sampling will require ten 12-hour days plus 1 day of travel;
- Sampling will be conducted at Level D; work at Levels C or B is not anticipated and will be considered out of the scope;
- 90 groundwater, 9 duplicate, 9 blank samples, 5 trip blanks and 5 matrix spikes will be collected and submitted to the CLP for analysis of VOCs. Twenty of the 90 samples will be collected for TCL scan; and
- Groundwater samples will be low concentration. Continuous HNu monitoring will be performed during purging and sampling.

Refer to Appendix A for an itemized description of Subtask 2.4 Costs.

SUBTASK 2.5 SURFACE WATER AND SEDIMENT SAMPLING

Based on VOC analyses of surface water and sediment samples obtained during Subtask 2.1.6, Bos Creek was identified as a probable source of VHHs to the shallow aquifer. This impact may vary seasonally, depending on the rate of volatilization from the creek. Therefore, an additional round of surface water and sediment sampling is proposed. The samples will be collected from

four locations on Bos Creek (Refer to Figure 6 for sample locations). The surface water and sediment samples will be collected according to procedures described in Subtask 2.1.7 of the approved work plan dated September, 1987. The surface water samples will be analyzed for VOCs using low detection GC/MS through SAS. The surface water samples will also be analyzed for VOCs using the on-site GC. Sediment samples will be analyzed for VOCs using fast turnaround GC/MS methods, according to SAS methods. Refer to Table 2 for a summary of the surface water and sediment sampling and analysis program.

Costs

To develop costs for the surface water and sediment quality monitoring program the following assumptions were used:

- One round of surface water and sediment samples will be collected from Bos Creek. Four (4) samples, 1 duplicate sample, 1 sample blank and a MS/MSD will be submitted to the designated CLP laboratory.
- The surface water and sediment sampling program will require 1 person approximately one-half day to complete and will be conducted simultaneously with the Round III groundwater sampling effort.

Refer to Appendix A for an itemized description of Subtask 2.5 costs.

SUBTASK 2.6 BOS CREEK DISCHARGE MEASUREMENTS

In order to refine the groundwater flow model calibration and determine the relationship of Bos Creek to the existing and previous groundwater flow regimes, surface water discharge and elevation measurements at Bos Creek will be required. These data will also be used to assess risks due to contact with VHH contaminated surface water.

This task will require continuous monitoring of creek elevation and intermittent measurement of stream discharge. An electronic data logger with attached pressure transducer will be located on Bos Creek in the pool above Randolph Street. The creek elevations will be monitored continuously for approximately 3 months (through the end of August). Stream discharge measurements will be made by Warzyn personnel at both Burns Street and

Randolph Street. The discharge measurements will be conducted approximately every two weeks throughout the three month monitoring period. The flow measurements will be made using both a pygmy flow meter and a Price current meter. Stream discharge measuring frequency will be increased during the week that Production Well CW6 is put back on line and is no longer pumped to waste into Bos Creek.

The stream elevation and flow velocity monitoring will be used to create flow versus elevation curves which will be used to assess variations in stream discharge rates. The difference between the average upstream and downstream discharge rates will be used to estimate the induced recharge into the aquifer.

Costs

To develop costs for the Bos Creek discharge monitoring, the following assumptions were used:

- Stream discharge measurements will require approximately six site visits by a field technician (one 12 hour day each visit).
- Stream discharge measurements will be taken for three successive days following Production Well CW6 being put back on line. The discharge measurements will be conducted concurrent with groundwater elevation monitoring in order to defer travel costs. The discharge measurements will require a field technician two eight hour days.

Subtask 2.7 Groundwater Level Monitoring

Due to the critical need to define the affects of induced surface water recharge on groundwater flow in the vicinity of Bos Creek, four additional rounds of water level data should be obtained from site monitoring wells. The data will be used to assess changes in groundwater flow resulting from variations in production well pumping rates, river stages and groundwater recharge. The water levels will be measured using a fiberglass tape and sounding device or an electronic water level indicator. The water level measuring devices will be calibrated prior to use so that readings from the various devices are consistent to within $\pm$ 0.01 feet (accuracy of the elevation survey).

Costs

To develop costs for the water level monitoring program, the following assumptions were used:

- Four rounds of water levels at all site monitoring wells (approximately 120) will require a two-man crew one 14 hour day to complete (6 hour travel plus 8 hour recording levels).

SUBTASK 2.8 DRAWDOWN TESTING

Continuous water level measurements will be conducted during the period when production well CW6 is put back into service (discontinue pumping to Bos Creek). The drawdown test will be conducted in cooperation with the City of Wausau. The water levels will be recorded at ten monitoring well locations (W55, W55A, R3S, R3D, W52, R4D, C2S, W53, E21, E21A) using a network of pressure transducer and data loggers. A transducer and data logger will also be installed at Bos Creek, to record surface water fluctuations (Refer to Subtask 2.6). The data loggers will be programmed to record water level measurements at 10 minute intervals. The water level measurements will commence several days prior to production well CW6 being put in service. If possible, production well CW6 will remain unpumped for approximately one week while water levels are recorded. The non-pumping water level measurements will be used to assess antecedent conditions (aquifer recovery) and to evaluate the aquifer response in the vicinity of Bos Creek. Water level measurements will be collected at each of the above mentioned monitoring points for approximately two weeks following production well CW6 being placed back in service. Production well CW3 will be pumped at a constant rate throughout the initial portion of the test so that drawdown due to pumpage of this well does not interfere with determination of the capture zone of production well CW6. After the zone of influence from production well CW6 has reached the maximum extent and water level measurements in the monitoring wells have stabilized production well CW3 will be turned off. Water level measurements will be continued until the recovery from production Well CW3 is no longer observable and water levels appear to have stabilized.

During the course of the test no effort will be made to regulate the pumpage of Production Wells CW7, CW9, CW4. However, the pumping schedule and approximate drawdown at these wells will be recorded several times a day during the test. Continuous record of river levels during the course of the test will be obtained from Wisconsin Valley Improvement Company (WVIC). Record of precipitation and barometric pressure will be obtained from the weather station in Wausau.

The drawdown data will be used to assess the extent of the capture zones from Production Wells CW6 and CW3. The test data will be evaluated in order to determine if hydraulic connection exists between apparent source areas and the municipal production wells.

Costs

To develop costs for the drawdown test program, the following assumptions were used:

- Six(6) data loggers and ten pressure transducers will be required for a period of approximately 25 days.
- The majority of the test will be conducted during the Phase II field investigation. However, two site visits (1 day each) by a hydrogeologist and field technician will be required at the start and conclusion of the test.
- Data will be downloaded from the data loggers a total of 4 times, requiring a hydrogeologist approximately 10 hours to complete each downloading event.

SECTION 3.0 SCHEDULE

The Phase II investigation can be separated into two major tasks; continued groundwater flow and contaminant transport modeling and field investigation. Several of the groundwater flow model alterations are presently being instituted. Additional modifications will be made when preliminary Bos Creek flow measurements have been completed. The contaminant transport calibration process will begin as soon as validated Round II VOC analysis results are received, QA completed, and the data evaluated. The flow and contaminant transport modeling activities will continue throughout the Feasibility Study (FS) and will be used to develop and evaluate remedial alternatives.

With the exception of the Bos Creek flow measurements and the additional rounds of groundwater level monitoring, the Phase II field investigation tasks will require approximately one month to complete. The soil gas survey and soil boring investigation will require approximately 8 days. Gas extraction test well and monitoring probes will also be installed during this time. The soil gas extraction test and test pit excavations will be conducted the following week. The soil gas extraction test at the former City Landfill will require approximately 2 days and will be completed prior to test pit excavations (Subtask 2.3). Test pit excavations at the former landfill will be performed while the soil gas extraction test is conducted at Wausau Chemical. Groundwater and surface water sampling will require approximately two weeks to complete and will be conducted before the other Phase II tasks have been completed. The drawdown test will require approximately 1 month to complete and will be conducted concurrently with the soil boring, test pit and sampling programs. The Bos Creek flow measurements will be conducted over a three month period and will begin as soon as practical. The stream elevation monitoring interval will be increased during the drawdown test (Subtask 2.8). The Phase II investigation schedule is summarized in Figure 7.

Results of the Phase II investigation will be incorporated into the RI report.

CSR/jpl/DLI
[jpl-601-40]

WARZYN

TABLES

TABLE 1
PROPOSED SOIL BORING DEPTH AND RATIONALE
WAUSAU NPL SITE
PHASE II INVESTIGATION

Boring Number	Anticipated Number of Soil Gas Samples	Estimated Depth (feet)	Rationale
West Study Area			
B1	2	15	Investigate potential sources of VHHs within the former landfill.
B2	2	15	Investigate potential sources of VHHs within the former landfill
B3	4	30	Investigate potential sources of VHHs within the former landfill
B4	2	10	Investigate potential sources of VHHs within the former landfill
B5	4	25	Investigate potential sources of VHHs within the former landfill
B6	4	30	Investigate potential sources of VHHs within the landfill and install gas monitoring probes
B7	3	20	Investigate potential sources of VHHs within the landfill and install gas monitoring probes
B8	3	20	Investigate potential sources of VHHs within the landfill and install gas monitoring probes
B9	2	10	Investigate potential sources of VHHs within the former landfill
B10	4	25	Investigate potential sources of VHHs within the former landfill and install gas extraction test well.

TABLE 1
PROPOSED SOIL BORING DEPTH AND RATIONALE
WAUSAU NPL SITE
PHASE II INVESTIGATION

B11	2	15	Investigate potential sources of VHHs within the landfill and install gas monitoring probes
B12	2	15	Investigate potential sources of VHHs within the landfill and install gas monitoring probes
B13-B16	4(EA)	30(EA)	Investigate potential sources of VHHs at the Marathon Electric facility.
East Study Area			
B17	2	15	Determine extent of elevated soil gas concentrations at Wausau Chemical, in the vicinity of the February 1983 PCE release.
B18	2	15	
B19	2	15	
B20	2	15	Delineate PCE soil contamination discovered at Boring E34 during the Phase I investigation
B21	2	15	
B22	2	15	Characterize residual PCE in unsaturated zone at the former Wausau Chemical bulk tank farm and install soil gas monitoring probe.
B23	2	15	
B24	2	15	
B25	2	15	Install gas extraction well.
B26	2	15	Discretionary soil borings location to be determined on-site.
B27	2	15	
B28	2	15	Investigate VHHs and petroleum related VOCs present in the unsaturated zone at the Wausau Energy facility.
B29	2	15	
B30	2	15	
	78	560 feet	

CSR/jpl/DFK
[jpl-402-88]

WARZYN

TABLE 2
SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
WAUSAU NPL SITE
PHASE II INVESTIGATION

1) Matrix	2) Field Parameters	3) Lab	Number of Samples	Duplicates	Field Blanks	4) MS/MSD	5) Matrix Total	6) Test Parameters
Groundwater new and existing wells Subtask 2.4 Phase II	pH, specific conductivity, temperature	CLP (SAS)	90	9	9	5	108	VOC,
		CLP (SAS)	23	2	2	2	27	TCL Parameters
Surface Water Subtask 2.5 Phase II	pH, specific conductivity,	CLP (SAS)	4	1	1	1	6	VOC
Soil Gas Subtask 2.1 Phase II	On-site GC VOC-screen	Field GC	78	*7	*7	*	92	VOC's
Groundwater during drilling Subtask 2.1 Phase II	On-site GC VOC-screen	Field GC	9	*1	*1	*	11	VOC
		CLP (SAS)	9	1	1	1	11	VOC
Soil (Soil Borings) Subtask 2.1 Phase II	VOC-screen Using PID	CLP (SAS)	24	2	2	--	28	VOC, Base/neutral and acid extractables, metals and cyanides
Soil (Test Pits) Subtask 2.3 Phase II	VOC Screen Using PID	CLP (SAS)	16	2	2	--	20	VOC, Base/Neutral and acid extractables, metals and cyanides

* Duplicates, blanks and spikes will be analyzed on a per day basis for on-site GC analyses as outined in Appendix F.
*** Column 5 matrix total does not include matrix spikes and matrix spike duplices.

TABLE 2
SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
WAUSAU NPL SITE
PHASE II INVESTIGATION

1) Samples are to be considered low concentration

2) Field parameters run by Warzyn sampling personnel.

3) Contract Laboratory Program, RAS, SAS

4) Triple the sample volume will be collected for matrix spike/matrix spike duplicate analysis

5) The matrix spike/matrix spike duplicate samples are at a frequency of one per twenty investigative samples.

6) Sample blank numbers are estimated. Actual numbers may vary based on field conditions.

SGW/jpl/CSR
[jpl-402-89]

WARZYN

TABLE 3
PROPOSED ROUND 3 SAMPLE LOCATIONS
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

City Production Wells (5)
CW3
CW4
CW6
CW7
CW9

U.S. EPA RI/FS Installed Monitoring Wells (30)

E20
E21, E21A
E22, E22A
E23A
E24, E24A
E25, E25A
E26, E26A
E27
E28A
E29A
E30
E31
E37A
W50
W51
W52, W52A
W53, W53A
W54
W55, W55A
W56, W56A
W57

Previously Existing Monitoring Wells (38)

East

WC1 (to be repaired)
WC2
WC3, WC3A, WC3B, WC3C
WC5, WC5A
MW10A, MW10B
MW11
MW13
FVD2
FVD7
GM9S

WARZYN

MW14
GM6D
GM5D
GM8D
WERGIN
MW7A
WW2
TCT40

West

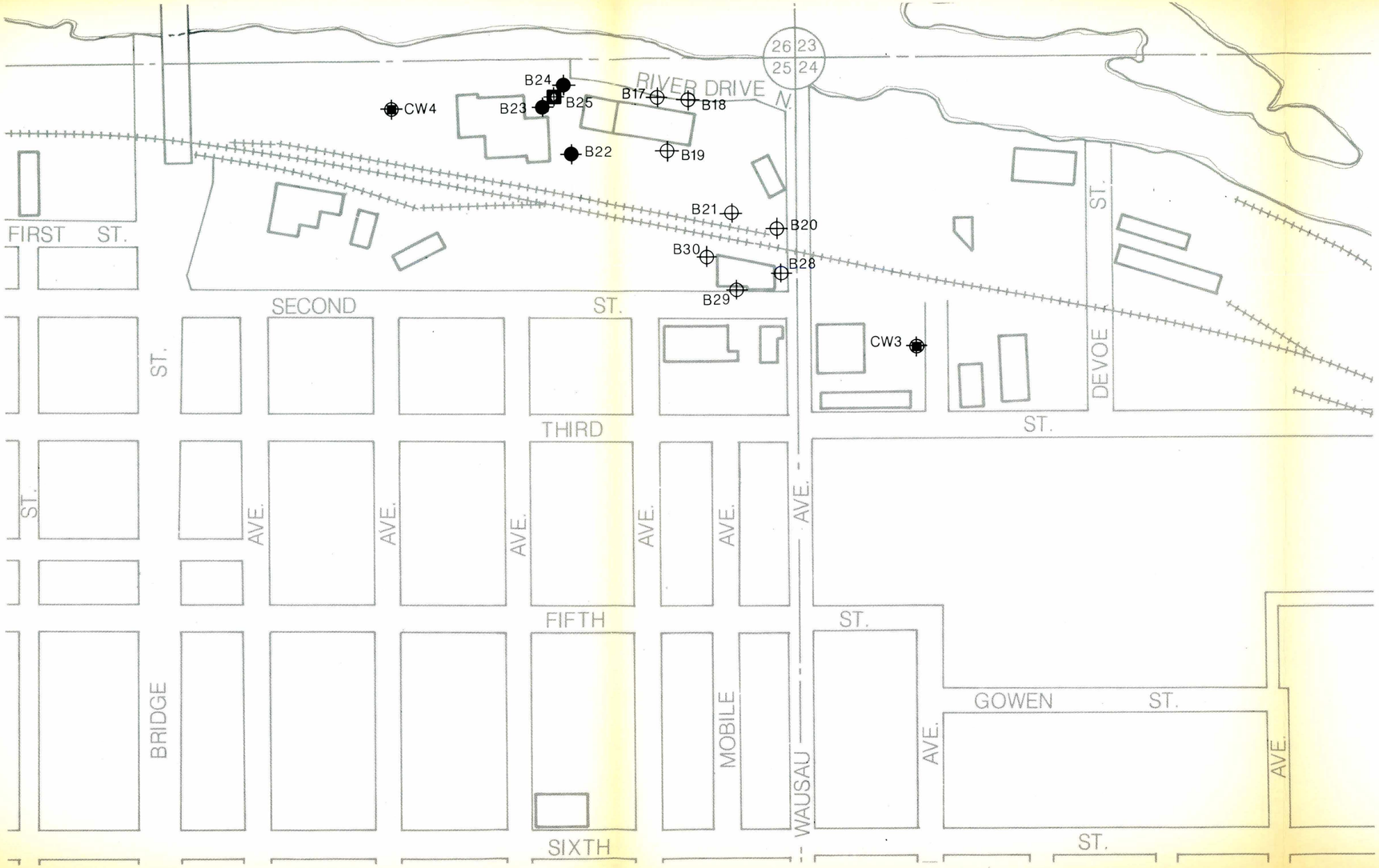
C6S
C4S, C4D
C3S
C2S
C7S
R4D
R3S
R3D
R2S, R2D
R5S (Marathon Electric Wells
R6S installed January, 1987)
R7S
MW7

Wausau Chemical Extraction Wells

Five (5) pumping extraction wells located on south side of Wausau Chemical.

CSR/jpl/DFK
[jpl-402-72]

DRAWINGS



LEGEND

- B17 ⊕ PROPOSED SOIL BORING LOCATION AND NUMBER
- CW3 ● PROPOSED PRODUCTION WELL LOCATION AND NUMBER
- B14 ● PROPOSED SOIL BORING WITH PERMANENT GAS MONITORING PROBE LOCATION AND NUMBER
- B21 ■ PROPOSED GAS EXTRACTION WELL LOCATION AND NUMBER

NOTES

1. REFER TO TABLE 1 FOR A SUMMARY OF ANTICIPATED SOIL BORING DEPTHS AND RATIONALE FOR CONDUCTING THE BORINGS.
2. TWO ADDITIONAL BORING LOCATIONS WILL BE DETERMINED IN THE FIELD BASED ON THE SOIL GAS SURVEY RESULTS AND FIELD GAS CHROMATOGRAPH ANALYSIS OF SOIL SAMPLES.
3. SOIL GAS SAMPLES WILL BE COLLECTED AT DEPTHS OF 5 AND 10 FEET.

FIGURE 1

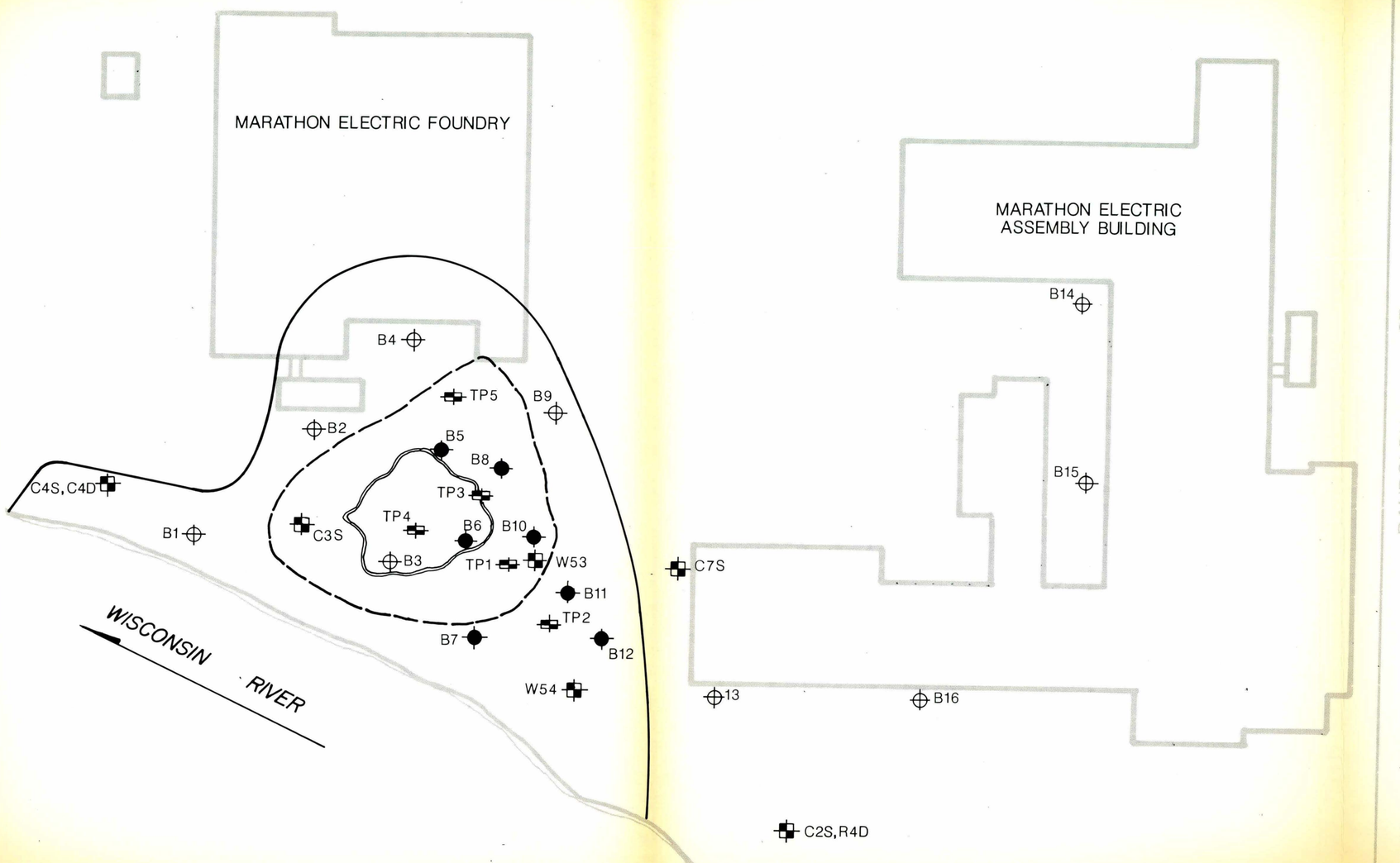
PROPOSED SOIL BORING LOCATIONS
EAST STUDY AREA

QUALITY ASSURANCE PROJECT PLAN ADDENDUM
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Designed By
Drawn By JC
Checked By CSR
Approved By Donna Lyman
Date 6/16/88
Scale 1" = 200' (APPROXIMATE)
Reference

WARZYN ENGINEERING INC.
Madison • Milwaukee
Minneapolis • Denver

Sheet Number 1 OF 3
Project Number 13076 B28



LEGEND

- W53 — MONITORING WELL LOCATION AND NUMBER
- B1 — PROPOSED SOIL BORING LOCATION AND NUMBER
- B10 — PROPOSED SOIL BORING WITH PERMANENT GAS MONITORING PROBE PROBE LOCATION AND NUMBER
- TP1 — PROPOSED TEST PIT LOCATION AND NUMBER
- LIMITS OF FILL (BASED ON AERIAL PHOTOGRAPHY DATED 9/28/48)
- FORMER SAND AND GRAVEL PIT EXCAVATION ESCARPMENT BASED ON AERIAL PHOTOGRAPHY DATED 9/28/48
- MAXIMUM LANDFILL THICKNESS BASED ON LOCATIONS WHERE THE SAND AND GRAVEL OPERATIONS HAD EXCAVATED INTO WATER TABLE (BASED ON AERIAL PHOTOGRAPHY DATED 9/28/48

NOTES

1. SOIL BORING DEPTHS WILL BE DETERMINED IN THE FIELD BASED ON THE LANDFILL THICKNESS.
2. TEST PIT EXCAVATION DEPTHS ARE PLANNED TO BE BETWEEN 15 TO 20 FEET.
3. AN ADDITIONAL 3 TEST PIT LOCATIONS WILL BE SELECTED BASED ON RESULTS OF THE SOIL BORING/SOIL GAS SURVEY.
4. TWO ADDITIONAL BORING LOCATIONS (EAST AND/OR WEST STUDY AREAS) DETERMINED IN THE FIELD BASED ON THE SOIL GAS SURVEY RESULTS AND FIELD GAS CHROMATOGRAPH ANALYSIS OF SOIL SAMPLES.
5. SOIL GAS SAMPLES WILL BE COLLECTED ON 10 FOOT INCREMENTS DURING DRILLING.

north

FIGURE 2

Designed By — Drawn By: JC — Checked By: CSK

Approved By: Lenna Lewis — Date: 6/16/88

Scale: 1" = 100' (APPROXIMATE) — Reference

WARZYN ENGINEERING, INC. — Madison • Milwaukee • Minneapolis • Detroit

Date — By — App'd

PROPOSED SOIL BORING AND TEST PIT LOCATIONS WEST OF STUDY AREA

QUALITY ASSURANCE PROJECT PLAN ADDENDUM
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Sheet Number: 2 OF 3

Project Number: 13076 B29

WARZYN

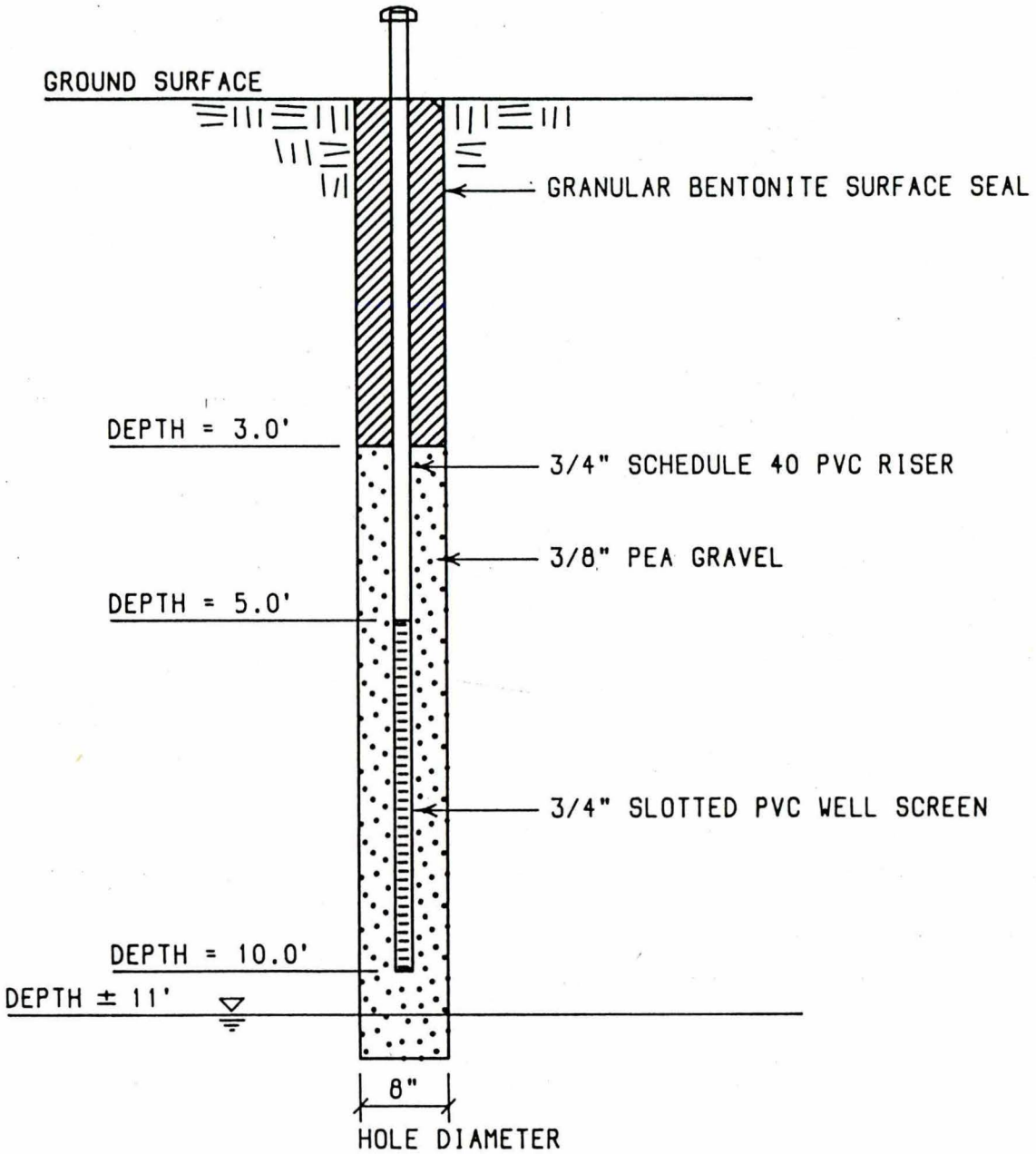


FIGURE 3

NOT TO SCALE

DWN ALH	APP'D DLI	DATE 6/16/88	13076	A12

WARZYN

PROPOSED GAS MONITORING PROBE INSTALLATION DIAGRAM-E. STUDY AREA
PHASE II WORK PLAN
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

TELEDYNE POST N67178

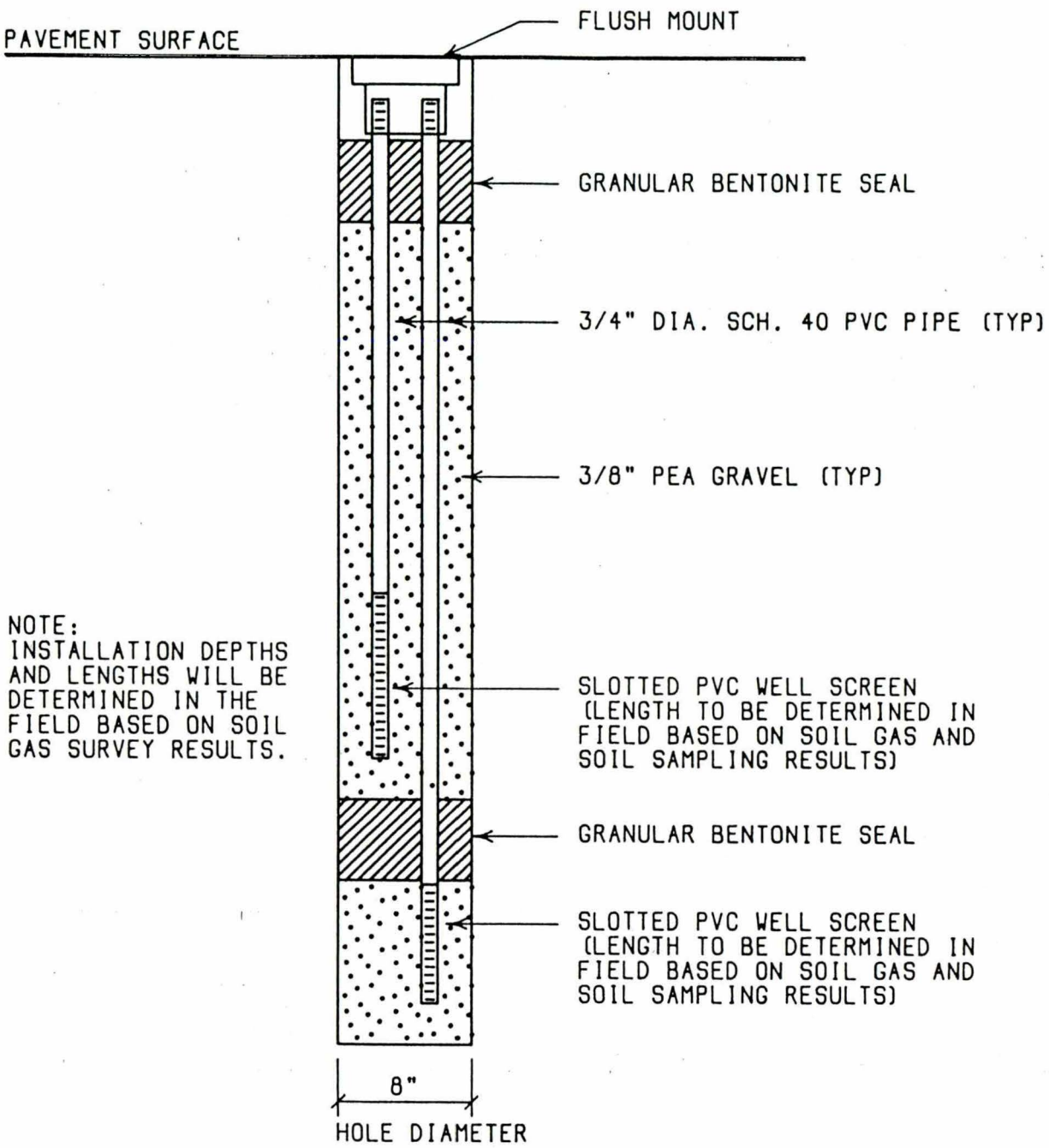


FIGURE 4

NOT TO SCALE

DWN ALH	APP'D DLI	DATE 6/16/88	13076	A13

WARZYN

PROPOSED GAS PROBE NEST DETAIL

PHASE II WORK PLAN
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

TELEDYNE POST N47178

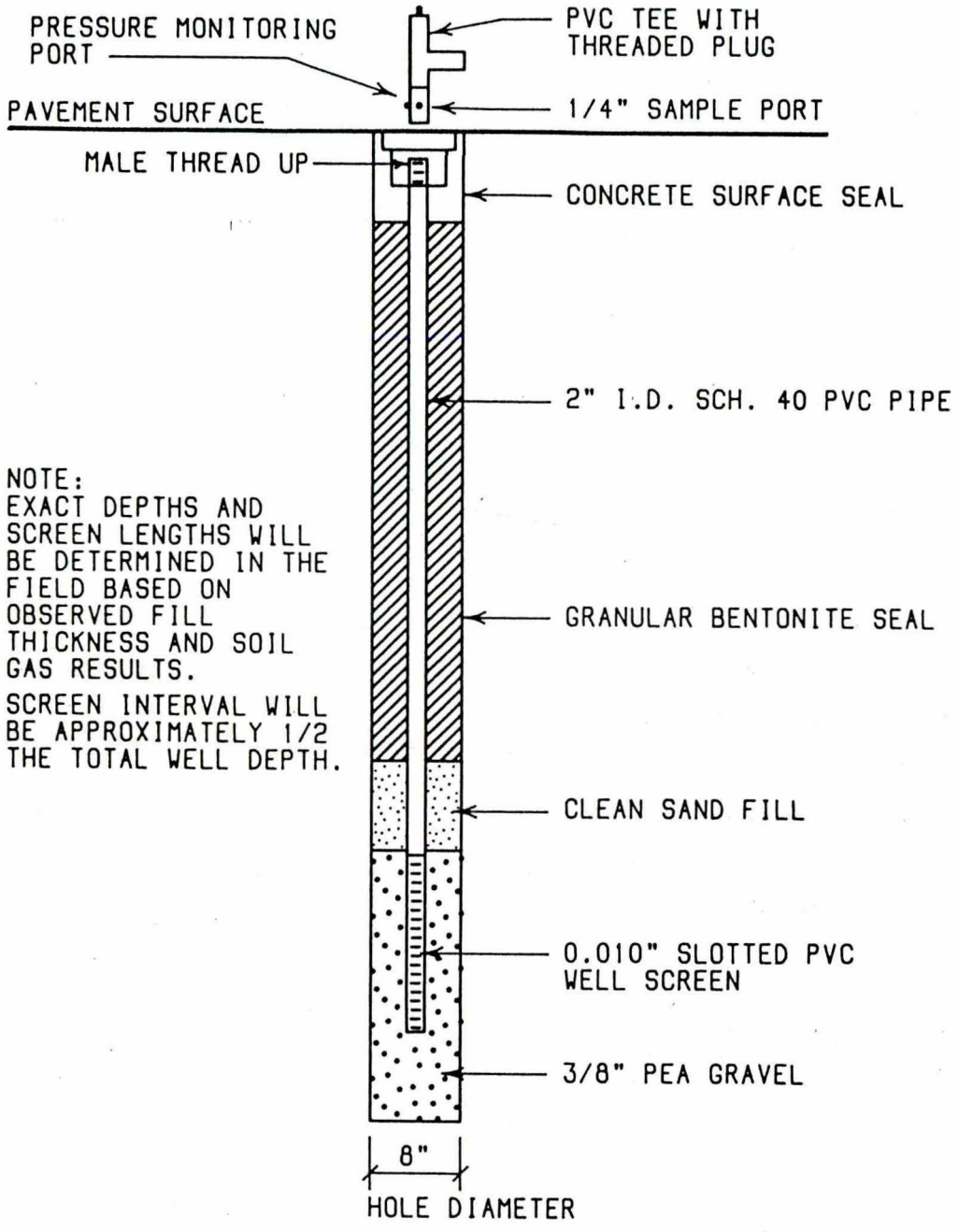


FIGURE 5

NOT TO SCALE

DWN ALH	APP'D DLI	DATE 6/16/88	13076	A14

WARZYN

CONCEPTUAL GAS EXTRACTION TEST WELL

PHASE II WORK PLAN
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

TELEDYNE POST N67178

LEGEND

W6	MONITORING WELL LOCATION AND NUMBER
CW9	PUMPING MUNICIPAL WELL LOCATION AND NUMBER
E35	SOIL BORING LOCATION AND NUMBER
SWO2	SURFACE WATER SAMPLING LOCATION AND NUMBER

NOTES

1. REFER TO TABLE 2 FOR A SUMMARY OF PROPOSED SAMPLING AND ANALYSIS.
2. REFER TO TABLE 3 FOR A SUMMARY OF ROUND 3 GROUNDWATER SAMPLE LOCATIONS.

north

PROPOSED ROUND 3 SAMPLING LOCATIONS

PHASE II WORK PLAN
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

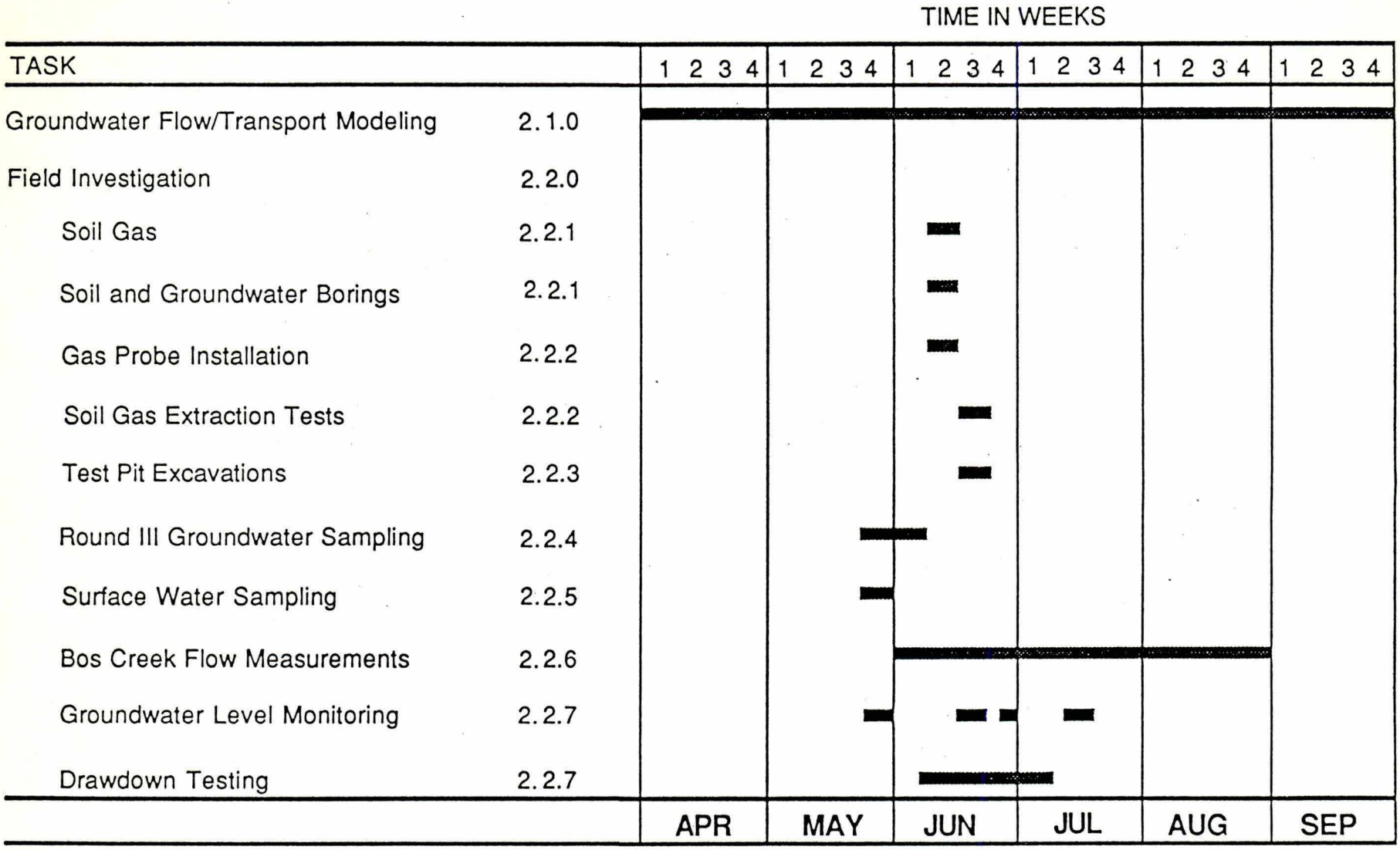
Drawn By: JR
Checked By: CJR
Date: 6/16/88
Designed By:
Approved By: Seamus McCann
Scale: 1" = 400' (APPROXIMATE)

WARZYN
Engineering Inc.
A Warzyn Company
Madison, Milwaukee
Minneapolis, Chicago
Denver

Sheet Number: 3 OF 3
Project Number: 13076 B30

FIGURE 6

FIGURE 7
PROPOSED SCHEDULE PHASE II WORK PLAN
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN



13076.16/DLI

APPENDIX A

PROPOSED PHASE II BUDGET

COST ELEMENT	1988 RATE	MODEL ADJUSTMENTS HOURS	MODEL ADJUSTMENTS AMOUNT	MODEL CALIBRATION HOURS	MODEL CALIBRATION AMOUNT	MODELING HOURS	MODELING AMOUNT	BORINGS HOURS	BORINGS AMOUNT	TESTS HOURS	TESTS AMOUNT	INVESTIGATION HOURS	INVESTIGATION AMOUNT	SAMPLING HOURS	SAMPLING AMOUNT	SAMPLING HOURS	SAMPLING AMOUNT	MEASUREMENTS HOURS	MEASUREMENTS AMOUNT	MONITORING HOURS	MONITORING AMOUNT	HOURS	AMOUNT
1. LABOR																							
P-4	$35.56	35	$1,244.60	40	$1,422.40	25	$889.00	8	$284.48	4	$142.24	4	$142.24	4	142.24	0	$0.00	4	$142.24	0	0	4	$142.24
P-3	$25.10	0	$0.00	10	$251.00	5	$125.50	2	$50.20	0	$0.00	0	$0.00	0	0.00	0	$0.00	60	$1,506.00	0	0	0	$0.00
P-2	$19.92	120	$2,390.40	280	$5,577.60	100	$1,992.00	4	$79.68	60	$1,195.20	0	$0.00	0	0.00	0	$0.00	5	$99.60	0	0	2	$39.84
P-1	$14.95	10	$149.50	25	$373.75	15	$224.25	200	$2,990.00	8	$119.60	50	$747.50	280	4186.00	20	$299.00	10	$149.50	8	$119.60	90	$1,345.50
T-2	$11.14	15	$167.10	15	$167.10	20	$222.80	120	$1,336.80	65	$724.10	60	$668.40	360	4010.40	20	$222.80	72	$802.08	112	$1,247.68	20	$222.80
T-1	$7.62	0	$0.00	0	$0.00	0	$0.00	20	$152.40	10	$76.20	10	$76.20	5	38.10	2	$15.24	0	$0.00	0	$0.00	0	$0.00
TOTAL LABOR HRS./$		180	$3,951.60	370	$7,791.85	165	$3,453.55	354	$4,893.56	147	$2,257.34	124	$1,634.34	649	$8,376.74	42	$537.04	151	$2,699.42	120	$1,367.28	116	$1,750.38
OVERHEAD AND G&A	1.6992		$6,714.56		$13,239.91		$5,868.27		$8,315.14		$3,835.67		$2,777.07		$14,233.76		$912.54		$4,586.85		$2,323.28		$2,974.25
FEE (7.5%)	0.075		$503.59		$992.99		$440.12		$623.64		$287.68		$208.28		$1,067.53		$68.44		$344.01		$174.25		$223.07
1. TOTAL LABOR W/FEE			$11,169.75		$22,024.75		$9,761.94		$13,832.33		$6,380.69		$4,619.69		$23,678.03		$1,518.02		$7,630.29		$3,867.53		$3,157.31
EXPENSE SUMMARY	UNIT RATE	UNITS	AMOUNT	UNITS	AMOUNT	UNITS	AMOUNT	UNITS	AMOUNT	UNITS	AMOUNT	UNITS	AMOUNT	UNITS	AMOUNT	UNITS	AMOUNT	UNITS	AMOUNT	UNITS	AMOUNT		
TRANSPORTATION																							
a. VAN RENTAL (day)	$25.00	0	$0.00	0	$0.00	0	$0.00	11	$275.00	5	$125.00	5	$125.00	20	$500.00	1	$25.00	6	$150.00	2	$50.00	2	$50.00
b. MILEAGE (per mile)	$0.25	0	$0.00	0	$0.00	0	$0.00	800	$200.00	400	$100.00	400	$100.00	800	$200.00	350	$87.50	2400	$600.00	650	$162.50	600	$150.00
c. CAR MILEAGE(per mile)	$0.25	0	$0.00	0	$0.00	0	$0.00			0	$0.00	400	$100.00	400	$100.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
SUBTOTAL		0	$0.00	0	$0.00	0	$0.00		$475.00		$225.00		$325.00		$800.00		$112.50		$750.00		$212.50		$200.00
B. SUBSISTENCE																							
a. MEALS (day)	$23.00	0	$0.00	0	$0.00	0	$0.00	24	$552.00	10	$230.00	15	$345.00	50	$1,150.00	4	$92.00	15	$345.00	16	$368.00	4	$92.00
b. LODGING (day)	$44.00	0	$0.00	0	$0.00	0	$0.00	18	$792.00	8	$352.00	12	$528.00	40	$1,760.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
SUBTOTAL		0	$0.00	0	$0.00	0	$0.00		$1,344.00		$582.00		$873.00		$2,910.00		$92.00		$345.00		$368.00		$92.00
C. HEALTH AND SAFETY COSTS																							
a. HNU	$55.00	0	$0.00	0	$0.00	0	$0.00	16	$880.00	1	$55.00	1	$55.00	20	$1,100.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
b. H2CK METER (day)	$31.80	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	1	$31.80	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
c. SCBA STANDBY (day)	$4.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
d. Level B (day)	$140.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	6	$840.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
e. Level C (day)	$105.00	0	$0.00	0	$0.00	0	$0.00	4	$420.00	4	$420.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
f. Level D (day)	$85.00	0	$0.00	0	$0.00	0	$0.00	12	$1,020.00	6	$510.00	0	$0.00	40	$3,400.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
g. Level E (day)	$27.00	0	$0.00	0	$0.00	0	$0.00	8	$216.00	2	$54.00	3	$81.00	10	$270.00	2	$54.00	6	$162.00	8	$216.00	4	$108.00
h. Cascade sys. (day)	$10.61	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	6	$63.66	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
i. Air line (day)	$31.80	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
j. Decon Supplies	$30.00	0	$0.00	0	$0.00	0	$0.00	8	$240.00	5	$150.00	3	$90.00	10	$300.00	2	$60.00	0	$0.00	0	$0.00	0	$0.00
SUBTOTAL									$2,776.00		$1,189.00		$1,161.46		$5,070.00		$114.00		$162.00		$216.00		$108.00
D. EQUIPMENT RENTAL COSTS (daily rates)																							
a. SK Pump	$10.60	0	$0.00	0	$0.00	0	$0.00	8	$84.80	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
b. Soil Gas Probes	$5.30	0	$0.00	0	$0.00	0	$0.00	15	$79.50	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
c. SS Spatulas	$5.30	0	$0.00	0	$0.00	0	$0.00	5	$26.50	0	$0.00	3	$15.90	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
d. Bailer	$3.00	0	$0.00	0	$0.00	0	$0.00	16	$48.00	0	$0.00	0	$0.00	20	$60.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
e. Eductor Blower	$75.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	5	$375.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
f. Gastech comb.gas meter	$35.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	5	$175.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
g. Velocity meter	$25.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	5	$125.00	0	$0.00	0	$0.00	0	$0.00	6	$150.00	0	$0.00	0	$0.00
h. Johnson/keck pump	$100.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	20	$2,000.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
i. Cooler (EA)	$15.00	0	$0.00	0	$0.00	0	$0.00	8	$120.00	0	$0.00	6	$90.00	10	$150.00	2	$30.00	0	$0.00	0	$0.00	0	$0.00
j. Radio (EA)	$13.00	0	$0.00	0	$0.00	0	$0.00	18	$234.00	5	$65.00	6	$78.00	30	$390.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
k. Conductivity Meter	$10.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	20	$200.00	2	$20.00	0	$0.00	0	$0.00	0	$0.00
l. Water level Ind.	$10.00	0	$0.00	0	$0.00	0	$0.00	8	$80.00	0	$0.00	0	$0.00	20	$200.00	2	$20.00	0	$0.00	4	$40.00	30	$300.00
m. Ph meter	$10.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	20	$200.00	2	$20.00	0	$0.00	0	$0.00	0	$0.00
n. Trailer (month)	$350.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	1	$350.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
o. Computer Time(CPU)	$90.00	25	$2,250.00	20	$1,800.00	12	$1,080.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
p. Word Proc./Micro(hr)	$10.00	20	$200.00	50	$500.00	20	$200.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	20	$200.00	0	$0.00	30	$300.00
SUBTOTAL			$2,450.00		$2,300.00		$1,280.00		$672.80		$740.00		$183.90		$3,550.00		$70.00		$350.00		$40.00		$600.00
E. SAMPLE/ANALYSES COSTS																							
a. Sapl Shipping(per sap)	$15.00	0	$0.00	0	$0.00	0	$0.00	32	$480.00	0	$0.00	20	$300.00	106	$1,590.00	6	$90.00	0	$0.00	0	$0.00	0	$0.00
b. Distilled Water(gal)	$1.50	0	$0.00	0	$0.00	0	$0.00	30	$45.00	0	$0.00	20	$30.00	100	$150.00	8	$12.00	0	$0.00	0	$0.00	0	$0.00
c. Field GC (day)	$800.00	0	$0.00	0	$0.00	0	$0.00	8	$6,400.00	2.5	$2,000.00	3	$2,400.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
SUBTOTAL			$0.00		$0.00		$0.00		$6,925.00		$2,000.00		$2,730.00		$1,740.00		$102.00		$0.00		$0.00		$0.00
F. SUPPLIES																							
a. 3/4" PVC RISER (foot)	$1.30	0	$0.00	0	$0.00	0	$0.00	0	$0.00	435	$565.50	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
b. 2" PVC RISER (foot)	$2.25	0	$0.00	0	$0.00	0	$0.00	0	$0.00	35	$78.75	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
c. Gravel & Transport (Ton)	$80.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0.5	$40.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
d. Granular Bentonite (bag)	$7.50	0	$0.00	0	$0.00	0	$0.00	24	$180.00	22	$165.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
e. Protective casing	$60.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	6	$360.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
f. caps & plugs (ea.)	$3.10	0	$0.00	0	$0.00	0	$0.00	0	$0.00	30	$93.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
g. Sand (Bag)	$5.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	30	$150.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
h. 55 Gal Drum	$25.00	0	$0.00	0	$0.00	0	$0.00	5	$0.00	0	$0.00	5	$125.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	6	$150.00
i. Drum Overpack	$30.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	5	$150.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00
SUBTOTAL									$180.00		$1,452.25		$275.00		$0.00		$0.00		$0.00		$0.00		$150.00
G. LEASED EQUIPMENT																							
a. Data Logger(month)	$700.00																	3	$2,100.00			5	$3,500.00
b. Pressure Transducer(month)	$400.00																	3	$1,200.00			10	$4,000.00
																							$7,500.00
TOTAL EXPENSES			$2,450.00		$2,300.00		$1,280.00		$11,847.80		$11,847.80		$12,372.80		$14,070.00		$490.50		$4,907.00		$836.50		$8,650.00
MARKUP (7.5%)	0.075		$183.75		$172.50		$96.00		$888.59		$888.59		$927.96		$1,055.25		$36.79		$368.03		$62.74		$648.75
TOTAL EXPENSES AND MARKUP			2633.75		$2,472.50		$1,376.00		$12,736.39		$12,736.39		$13,300.76		$15,125.25		$490.50		$5,275.03		$899.24		$9,298.75
TOTAL SUBCONTRACTS			$0.00		$0.00		$0.00		$14,338.00		$0.00		$9,200.00		$0.00		$0.00		$0.00		$0.00		$0.00
MARKUP (7.5%)			$0.00		$0.00		$0.00		$1,075.35		$0.00		$690.00		$0.00		$0.00		$0.00		$0.00		$0.00
TOTAL SUBCONTRACTS AND MARKUP			$0.00		$0.00		$0.00		$15,413.35		$0.00		$9,890.00		$0.00		$0.00		$0.00		$0.00		$0.00
TOTAL TASK COSTS			$13,803.50		$24,497.25		$11,137.94		$41,982.07		$19,117.07		$27,810.45		$38,803.28		$2,008.52		$12,905.31		$3,396.77		$12,496.06

PHASE II TOTAL $297,958.23