US Army Corps of Engineers
Toxic and Hazardous Materials Agency

Manitowoc Army Reserve Center Manitowoc, Wisconsin

Final Addendum to Sampling Design Plan Follow-On Site Investigation

June 1991

Prepared for:

U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland 21010-5401

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FOLLOW-ON
SITE INVESTIGATION AT THE
MANITOWOC ARMY RESERVE CENTER (MARC)
ADDENDUM TO SAMPLING DESIGN PLAN
DATA ITEM A004
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Submitted to:

United States Army Toxic and
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Submitted by:

OHM Remediation Services Corp.
Pittsburgh, Pennsylvania
A Subsidiary of OHM Corporation

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1.0 INTRODUCTION

This addendum to the Sampling Design Plan has been prepared by OHM Remediation Services Corp. (OHM), a wholly owned subsidiary of OHM Corporation, to support Task Order No. 003 of Contract No. DAAA15-90-D-0019 for the requirement entitled "Follow-On Site Investigation at the Manitowoc Army Reserve Center (MARC)."

The Sampling Design Plan (Data Item A004), June 1990, was prepared by E. C. Jordan Co., (Jordan) for the Site Investigation (SI) at MARC. The Jordan SI report was completed in August 1990.

This addendum to the Sampling Design Plan describes the rationale and technical specifications for the required testing, sampling, analyses, and quality control (QC) procedures for the Follow-On Site Investigation (FSI).

This addendum to the Sampling Design Plan is supported in part by the Sampling Design Plan (Data Item A004); the Quality Control Plan (Data Item A006), June 1990; and the Accident Prevention and Safety Plan (APSP) (Data Item A009), June 1990).

2.0 JORDAN SITE INVESTIGATION - AUGUST 1990

The SI conducted by Jordan focused on identification and evaluation of potential on-site contamination sources, subsurface geology, and assessment of ground water flow direction and chemical quality within the installation boundaries upgradient of Collector "B." Field activities conducted during the fall of 1989 as part of this investigation included:

- An initial site reconnaissance to select soil/sediment sampling and monitoring well locations

- The field investigation program, consisted of the installation of seven monitoring wells (MW-1A, MW-2A, MW-2B, MW-3, MW-4, MW-5, and MW-6), completion of three test borings (TB-1, MW-2T, and MW-5T), collection of six soil, two sediment, and one surface water sample (SEEP 1) for chemical analysis, and completion of aquifer testing of seven wells

- Collection of two rounds of ground water samples from the seven newly installed monitoring wells (MW-1A, MW-2A, MW-2B, MW-3, MW-4, MW-5, and MW-6) for chemical analysis

- Soil and ground water samples were analyzed for volatile organics, metals, mercury, and total petroleum hydrocarbons, see Table 3 for list of volatile compounds

- Horizontal location and vertical elevation surveys of the new monitoring wells, test borings, and seeps.

The results of the SI (Jordan, August 1990) indicated that MARC is not the source of trichloroethylene in Ranney Collector "B." No trichloroethylene was found in soils or ground water at MARC. Secondly, the SI reported that the ground water potentially affected by MARC activities is isolated vertically by an aquitard from the aquifer tapped by Collector "B." The perched system, therefore, does not appear to be collected by Collector "B." The following paragraphs describe rationale for this conclusion.

The geologic setting beneath MARC is generally characterized by a fine to medium-grained silty sand overlying a moderately to highly plastic clay till, beneath which is a fine- to medium-grained uniform sand. The clay till is interpreted as being the Haven Till, and appears to be present from the eastern boundary of MARC to Collector "B" and the shore of Lake Michigan.

The clay till layer beneath MARC acts as an aquitard and effectively creates a locally perched water-table aquifer in the upper silty sand. Recharge to this perched system is interpreted by Jordan to be a result of infiltration of precipitation. A ground water divide for this perched system trends north-south through MARC. Ground water discharge from this perched system occurs as seeps which trend north-south along the eastern side of the hill atop which MARC is located. Horizontal ground water velocities in the perched system on the eastern side of MARC, as determined by Jordan, are approximately 60 feet/year.

According to Jordan, the clay till aquitard is a confining unit for the saturated lower sand unit found beneath MARC. The computed downward vertical hydraulic gradient of 0.53 feet/foot from the shallow to the deep aquifer and the perched ground water in the upper silty sand suggests that the clay till aquitard is relatively impermeable to the downward migration of water. Because of these conditions, the ground water from the perched system is not interpreted to be in communication with or within the zone of influence of Collector "B."

The SI contamination assessment describes contaminant distribution and interpretation in the soils and ground water at MARC. Trichloroethylene was not found on site in any of the soil or ground water samples. Volatile organic compounds (VOCs) were not found in the downgradient vicinity of three suspected sources of ground water contamination at MARC as follows:

- The wash rack/dry well
- The motor vehicle storage shed
- The POL shed.

Very low concentrations of the VOCs, ranging from 0.505 μg/L to 1.15 μg/L were found in ground water in the vicinity of the septic tank and drainage field during the two rounds of ground water sampling. These were 1,2-dichloroethane, 1,1-dichloroethane, tetrachloroethylene, and 1,2-dichloroethylene. The concentrations of the VOCs detected are very close to certified reporting limits (CRLs), making their identification and quantification by the gas chromatographic method employed somewhat uncertain. Only one VOC, 1,2-dichloroethane, was detected at the same well (MW-6) in both rounds of ground water sampling. This compound is not a transformation product of trichloroethylene, nor can it be transformed to trichloroethylene by natural processes. Predictions using estimated contaminant velocities in the perched ground water system indicate that if trichloroethylene were discharged from the septic tank area, it would have traveled 50 feet beyond the eastern boundary of MARC. This is based on the discharge occurring since initial operations began at the site in the mid-1950s. Wisconsin Department of

Natural Resources (WDNR) ground water sampling and analysis to date of Collector "B" has not detected the presence of transformation products associated with trichloroethylene.

Based on the above findings and interpretations of the SI, it has been concluded by Jordan that the presence of trichloroethylene in Manitowoc Public Utility (MPU) Collector "B" is not attributable to activities at MARC.

3.0 FIELD PROGRAM

The field investigation for the MARC FSI includes the following elements:

- o Field drilling and monitoring well installation
- o Soil/sediment sampling
- o Ground water sampling.

The field program rationale and detailed descriptions of activities/procedures are presented in this section.

3.1 PROGRAM DESCRIPTION AND RATIONALE

The objectives of the FSI are to determine whether MARC is the source of TCE at Collector Well "B" and if 1,2-dichloroethane confirmed from a MARC well has migrated off site toward Collector Well "B." To meet these objectives, the field program will utilize three off-site wells (MW-7, MW-8, and MW-9) to assess ground water quality between MARC and Collector "B." Also, one well (MW-10), one sediment sample (SED-3), and two soil borings (SB-1 and SB-2) located on site will be utilized to determine any migration of 1,2-dichloroethane.

Monitoring well and soil/sediment sampling locations for the FSI are shown on Figure 1, and monitoring well and soil/ sediment sampling rationale are presented in Table 1. Four monitoring wells, including two deep ground water wells (MW-9 and MW-10) and a two-well cluster (MW-7 and MW-8) for ground water quality evaluation, are planned.

A two-well cluster (MW-7 and MW-8) is proposed to be located between the MARC and Collector B. The cluster will be located approximately 400 feet east of MW-6 and about 550 feet west of the Collector Well "B." Monitoring Well MW-7 is the shallow well and will be approximately 30 feet deep. The cluster is downgradient and east of the leach field. The purpose of the shallow well is to monitor the shallow ground water zone to determine if 1,2-dichloroethane (confirmed in MW-6) has migrated off site toward Collector Well "B." Monitoring Well MW-8 is the deep well in the cluster and is proposed to be 90 feet deep. The well screen will be located at the same elevation as the lowest intake of Collector Well "B." The bottom of the screen for Collector Well "B" is at an elevation of 534 feet according to the Jordan SI report. The purpose of this well is to monitor the lower aquifer at the same elevation as the Collector Well "B" for TCE. The boring will also provide subsurface data to better define the geologic strata between MARC and Collector Well "B."

Monitoring Well MW-9 is a single deep well to be located 360 feet downgradient of MW-3 and MW-4. Monitoring Well MW-9 is about 400 feet east of the wash rack and about 600 feet west from Lake Michigan. This well is approximately 10 feet downgradient and east of the approximate limits of the seeps. Monitoring Well MW-9 is estimated to be 90 feet deep and the well screen will be set at about the same elevation as the lowest intake of Collector Well "B." The purpose of this well is to monitor the lower aquifer at the same level as the Collector Well "B" for TCE. In addition, the boring will provide additional information on the geologic conditions between MARC and Lake Michigan.

Monitoring Well MW-10 will be located adjacent to existing Monitoring Well MW-6, 50 feet east of the septic tank and drain field. Monitoring Well MW-10 is estimated to be 120 feet deep and will be screened at the same elevation as MW-8 and the lower limit of Collector Well "B." The purpose of this well is to monitor the lower aquifer to determine whether 1,2-dichloroethane has migrated into the deep zone and whether MARC is the source of TCE at Collector Well "B."

Monitoring well locations have been selected to:

- o Evaluate potential contamination sources (see Table 1 for project rationale)
- o Assess ground water chemical quality between the MARC site and Collector Well "B" to determine whether contamination is attributable to MARC
- o Determine ground water flow direction in the deep ground water aquifer
- o Provide subsurface soil profile information
- o Provide information to evaluate ground water contaminant migration pathways.

Two soil borings, SB-1 and SB-2, will be performed in the drain field area to obtain one soil sample from each boring just below the drain field pipe. The soil samples will be analyzed for VOCs, in particular 1,2-dichloroethane, to determine if the 1,2-dichloroethane in MW-6 came from the septic system.

A sediment sample, SED-3, will be obtained from the septic tank. The sample will be analyzed for VOCs, in particular, 1,2-dichloroethane to determine if the septic system is the source of the 1,2-dichloroethane. See Figure 2 for sample location.

In addition, the soil/sediment sampling program that is proposed will provide information on the presence of trichloroethylene (TCE), 1,2-dichloroethane, and other contaminants in the soils and/or sediment of the septic system area.

Specific drilling and monitoring well installation procedures, soil/sediment sampling procedures, and ground water sampling procedures are described in the following sections.

3.2 MONITORING WELL INSTALLATION AND TESTING PROCEDURES

The following paragraphs describe the general drilling and monitoring well installation techniques. Specific well locations are shown on Figure 1 and approximate depths and rationale are described in Table 1.

3.2.1 Drilling Techniques

Hollow-stem augers with a 4 1/4-inch inside diameter (I.D.) will be used to advance monitoring well borings. Hollow-stem augers are continuous-flight augers equipped with a hollow core that serves as a casing. During advancement, a removable center plug is placed in the bottom of this hollow core to prevent soil materials from entering the inside of the hollow-stem auger. Hollow-stem augers are advanced by a combination of rotation and downward pressure. The boring cuttings are compressed laterally and carried upward to the ground surface along the outside of the auger flights. When a desired depth is reached, the center plug is removed and a representative soil sample may be obtained by passing a split-spoon sampler through the inside of the hollow-stem auger and driving it out the bottom of the hollow-stem auger. Monitoring well borings will be sampled at 5-foot intervals for geologic logging (split-spoon sample collection procedures are described in Section 3.2.2). If subsurface conditions preclude the use of hollow-stem augers, a wash rotary method will be utilized.

An OHM geologist/hydrogeologist will be present during the drilling of borings and installation of monitoring wells. The OHM representative will maintain drilling logs, collect appropriate samples, and be equipped as required by the USATHAMA Geotechnical Requirements (1987) and the MARC QC Plan (Jordan, 1990). Original monitoring well boring logs will be submitted to USATHAMA within three working days after the completion of each boring. An example field boring log form is presented in Appendix A.

Drilling will be subcontracted to Exploration Technology, Inc., a qualified drilling contractor, capable of performing the required hollow-stem auger borings with split-spoon sampling and monitoring well installation. Generally, the drilling will proceed as follows:

- Water for drilling and decontamination will be obtained from the USATHAMA-approved source from the Village of Cleveland, Wisconsin, Water District). This source will be analyzed for all site-related contaminants and approved by USATHAMA prior to use.

- Bentonite and sand filter pack materials will be selected and submitted to USATHAMA for approval by the Contracting Officer's Representative (COR) as well as meet WDNR Chapter 141 requirements.

- Drilling will be conducted by Exploration Technology, Inc., under subcontract to OHM.

- Drilling tools and rig(s) will be steam-cleaned prior to being brought on site.

- Prior to the first boring and between borings and well installations, drilling tools will be steam-cleaned using the USATHAMA-approved water source.

- Well materials will be cleaned prior to installation as described in the USATHAMA Geotechnical Requirements (1987).

Drill cuttings and drilling fluids will be inspected visually for discoloration or other indications of contamination, and periodically screened with a photoionization detector (PID). Drill cuttings and drilling fluids will be handled in accordance with the Standard Operating Procedures for Containerization, Storage, Sampling, and Disposal (SOP) attached.

Downhole drilling and sampling equipment will be cleaned by washing and steam-cleaning prior to arrival on the MARC site. In addition, the drilling equipment, sampling equipment, and monitoring well screen and riser material will be steam-cleaned using water from the USATHAMA-approved water source after arrival on site. This cleaning will be conducted at a specific on-site location determined by USATHAMA. Well screens and risers will be covered with plastic after cleaning. At the completion of each monitoring well, drilling and sampling equipment will be steam-cleaned to prevent cross-contamination between borings. Solids and fluids generated by decontamination of the drilling and sampling equipment will be handled in accordance with the SOP.

Required levels of personal protection will be used as described in the APSP (Jordan, 1990) for the MARC FSI.

3.2.2 Lithologic Determination and Subsurface Sampling

Samples from all soil and monitoring well borings will be obtained for geologic logging. The subsurface soil samples will be collected from split-spoons in accordance with procedures contained in the MARC QC Plan (Jordan, 1990). The split-spoon sample will be retrieved from the boring and opened at rig-side. The OHM geologist/hydrogeologist will take charge of the sampling device as soon as it is withdrawn from the borehole and opened. The sampling device will be opened and screened with a PID. PID readings will be recorded on the WDNR Field Boring Log (see Appendix A).

The following data will also be included on the field boring logs:

- Depths, recorded in feet and fractions thereof (tenths of feet)

- Soil descriptions, in accordance with the Unified Soil Classification System (USCS), prepared in the field by the OHM site geologist/hydrogeologist

- Complete descriptions of soil samples - For split-spoon samples, the descriptions will include the following:

  - Classification
  - USCS symbol
  - Secondary components and estimated percentage
  - Color (using Munsell Soil Color Chart)
  - Plasticity
  - Consistency (cohesive soil) or density (noncohesive soil)
  - Moisture content
  - Texture/fabric/bedding
  - Depositional environment

- Numerical, visual estimates of secondary soil constituents (if terms such as "trace," "some," or "several" are used, their quantitative meanings will be defined in a general legend)

- The length of sample recovered for each sampled interval for drive (split-spoon) samples
- Blow counts, hammer weight, and length of fall for split-spoon samples
- Depth to water, along with the method of determination, as first encountered during drilling (any distinct water-bearing zones below the first zone also will be noted)
- A general description of drilling and equipment used, including such information as rod size, auger type, pump type, drill rig manufacturer, and model
- The drilling sequence
- Special problems
- Start and completion dates of borings
- Lithologic contacts.

The boring log will be submitted directly from the field to the COR within three working days after completion of the boring. Only the original log will be submitted to the COR to fulfill this requirement.

3.2.3 Monitoring Well Installation

Four monitoring wells will be installed for the MARC FSI, including two deep ground water wells and a two-well cluster (one deep and one shallow). Monitoring wells will be installed by Exploration Technology, Inc., a qualified drilling/monitoring well installation subcontractor, in accordance with USATHAMA Geotechnical Requirements (1987) and WDNR Chapter 141 Monitoring Well Installation Regulations. The OHM site geologist/hydrogeologist will supervise the installation of all monitoring wells and will maintain detailed drilling logs and as-built monitoring well construction diagrams. The OHM hydrogeologist will immediately contact USATHAMA for authorization to proceed in situations which require a change in monitoring well design or installation methods. Any abandoned borings will be grouted in the presence of the OHM site geologist/hydrogeologist in accordance with Paragraph III.A.11 of the geotechnical requirements. Grout will be mixed to consist of 20 parts cement to one part bentonite by weight. The grout will be installed by tremie pipe according to Paragraphs III.A.10.C of the Geotechnical Requirements.

Prior to commencing any portion of the proposed drilling plan, OHM will complete the following requirements (USATHAMA, 1987):

- o Arrange drill sites to minimize the potential for the possibility of spills and leaks from the drilling operation entering the borehole (Paragraph III.A.8)

- o Steam-clean drilling equipment prior to movement to MARC (Paragraph III.A.15)

- o At each drill location, clean equipment and supplies will be temporarily stored on sheets of disposable polyethylene sheeting to eliminate contamination from the native soils at the well location.

3.2.3.1 Well Installation Procedures

All well installations will begin within 48 hours of boring completion. Once begun, they will continue uninterrupted until completion. In all cases, the polyvinyl chloride (PVC) well screen and casing will be carefully steam-cleaned with water from the approved source prior to installation in the hole. All well screens will have a solid PVC bottom. Solid riser casing will extend from the screen to approximately 2-1/2 feet above ground surface. Sand filter pack material will be installed by tremie pipe around the well screen and will extend at least 5 feet above the top of the screen. A minimum 5-foot-thick seal consisting of bentonite pellets or a bentonite slurry will be placed above the sand pack. Cement-bentonite grout will be placed in the annular space above the bentonite seal. An example monitoring well construction diagram is shown in Appendix A.

The bentonite-cement grout will extend from the top of the bentonite seal to ground surface. Grouting will be completed as a continuous operation in the presence of the OHM site geologist/hydrogeologist. The grout will be pumped into the annular space under pressure using a tremie pipe placed at the top of the bentonite seal to ensure a continuous placement of the grout. The 8-foot-minimum-length protective casing will extend about 2-1/2 feet above ground surface and will be set in grout. Identification/protective posts, as required by Paragraph III.C.8 of the USATHAMA Geotechnical Requirements, will be installed around the well to prevent damage to the wells by vehicles. A coarse gravel pad, 6 inches thick, extending 4 feet radially from the protective casing, will be placed at each monitoring well.

Table 2 presents a summary of the estimated types and quantities of drilling and well materials to be used at MARC. The following materials will be used in well construction:

- o Casing will be flush-threaded polyvinyl chloride (PVC), 2-inch (nominal) I.D., Schedule 40 PVC pipe will be used for the shallow well while Schedule 80 PVC will be used for the deep wells. No PVC or glue solvents will be used. The well screen will be factory-slotted, with a slot width of 0.010 inch. Well screen lengths will be a minimum of 15 feet. A loose-fitting PVC cap will be used to cover the well casing. This will allow equilibration of the water level in the well with the atmosphere.

- o Grout will be composed by weight of 20-part Portland cement for one-part bentonite, with a maximum of 8 gallons of approved water per 94-pound bag of cement. These proportions may be modified with USATHAMA approval. Bentonite will be added after mixing the cement and water. Information concerning the bentonite will be submitted to USATHAMA for approval, as specified in Paragraph II.A.10.C of the geotechnical requirements.

- o Bentonite seals will consist of pellets or slurry, in accordance with WDNR requirements. Bentonite pellets or slurry used in the seal will be a commercially available product designed for well sealing purposes, and will contain no additives. Material for bentonite seals are also subject to USATHAMA approval.

- o Sand filter pack material around the well screen will be selected to be compatible with both the screen slot size and aquifer materials. Based on available geologic information, it is anticipated that a 30/40 sand with a uniformity coefficient of approximately 1.5 will be used.

- o Prior to use, 1 quart of the proposed sand filter pack material will be submitted to USATHAMA for approval. The lithology, grain-size distribution, and source of the material will be provided.

- o A 4-inch protective iron casing will be installed around all wells. This casing will extend approximately 2-1/2 feet above ground surface and will be seated approximately

5 feet into the well seal grout. In accordance with the USATHAMA Geotechnical Requirements (Paragraph III.C.8), this casing will be closed with a lockable, hinged cap.

- o A sketch of the well installation will accompany the boring log. It will show, by depth, the bottom of the boring, screen location, coupling location, sand filter pack material, seals, grout, cave-in, height of riser above ground surface, and details of the protective casing. The actual composition of the grout, seals, and sand filter pack material will be recorded on each sketch. As-built monitoring well construction diagrams will be submitted to USATHAMA within three working days of well completion.

- o After the grout seal has set (approximately 24 hours), it will be checked for settlement. Additional grout (of approved composition) will be added to fill any depressions.

3.2.3.2 Well Development

After allowing at least 48 hours after grout placement, monitoring wells will be developed by pump-and-surge methods using a pump. This method will involve pumping at successively greater extraction rates, interspersed with on-off cycling of the pump to provide filter pack flushing. Development will involve pumping at least five volumes of standing water from the well casing and sand pack annulus, and will be considered complete when the water exhibits stable specific conductivity readings and is free of fine sediment (to the fullest extent practical in accordance with the USATHAMA Geotechnical Requirements, Paragraph III.D.1-15). No water will be added to the well during development. If well yields cannot sustain a reasonable flow rate, a bottom discharge bailer will be used. The outside of the pump will be steam-cleaned with approved water. If a submersible pump is used, the inside of the pump will be cleaned by allowing approved water to run through the pump prior to initial use and before development of the next well. If pump rope and hose are used, they will be replaced between each well. Information on development of monitoring wells will be recorded and submitted to the COR within three working days after development. The following data will be recorded for development, as required in the USATHAMA Geotechnical Requirements (Paragraph III.D.14):

- o Well designation

- o Date of well installation

- o Date of development
- o Static water level before and 24 consecutive hours after development
- o Quantity of water loss during drilling and fluid purging, if water is used
- o Quantity of standing water in well and annulus (30 percent porosity assumed for calculation) prior to development
- o Specific conductivity, temperature, and pH measurements taken and recorded at the start, twice during, and at the conclusion of development (calibration standards will be run prior to, during, and after each day's operation in the field)
- o Depth from top of well casing to bottom of well
- o Screen length
- o Depth from top of well casing to top of sediment inside well, before and after development
- o Physical character of removed water, including changes during development in clarity, color, particulates, and odor
- o Types and size/capacity of pump and/or bailer used
- o Description of surge technique, if used
- o Height of well casing above ground surface
- o Typical pumping rate
- o Estimate of recharge rate
- o Quantity of water removed and time for removal.

A 1-pint sample of the last water obtained from the development process for each well will be retained and stored so as not to freeze, as required by USATHAMA. The cap and all internal components of the well casing above the water table will be rinsed with well water to remove all traces of soil, sediment, and cuttings. This washing will be conducted before and/or during development.

3.2.3.3 Surveying

Monitoring Wells MW-7 through MW-11 installed during this study will be surveyed by Brey, Stuewe & Braun, Inc., a professional land surveyor registered in the state of Wisconsin. The well survey will be conducted to establish the map coordinates within the Universal Transverse Mercator (UTM) or State Planar grid to within ±1.0 foot. Additionally, elevations for the natural ground surface at each sampling well and the top of the PVC casing will be determined to within ±0.05 feet and referenced to the National Geodetic Vertical Datum (NGVD) of 1929.

The survey will be completed as near to the time of last well completion as possible, but no longer than 1 week after well installation. Survey field data (as corrected to include loop closure for survey accuracy) will be included within the informal project data submittals (Data Items A013-A015). Closure will be within the horizontal and vertical limits given above. These data will clearly list the coordinates (and system) and elevation (i.e., ground surface, top of well, and protective casings), as appropriate, for all borings, wells, and reference marks. All permanent and semipermanent reference marks used for horizontal and vertical control (e.g., bench marks, caps, plates, chiseled cuts, and rail spikes) will be described in terms of name, character, and physical location.

All well drilling, installation, development, and surveying procedures/materials will be designed and conducted so that the well-acceptance criteria listed in Paragraphs III.F.1-3 of the USATHAMA Geotechnical Requirements are satisfied. This will ensure that water well sampling tasks proceed in a timely manner following well installation.

3.2.3.4 Water Level Measurement

All water level measurements at monitoring wells will be obtained using an electronic water level meter. The water level will be measured to an accuracy of less than 0.05 foot. The probe end of the water level meter will be rinsed with DI water and dried between monitoring wells.

At least two complete sets of static water level measurements for all monitoring wells (MW-1A, MW-2A, MW-2B, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, and MW-10) installed for this site will be made over single, consecutive 10-hour periods.

3.3 SAMPLING PROCEDURES

3.3.1 Soil Sampling Procedures

Two hand-augered/split-spoon soil borings will be advanced through the leach field. These borings are intended to provide information on the presence and distribution of contamination in the soil beneath the leach field. Samples will be collected using a split-spoon sampler at 2-foot intervals to a depth of 6 feet. The depth to the bottom of the leach field is approximately 4 feet. The last sample will be collected approximately 2 feet below the bottom of the leach field.

Samples from the soil borings will be obtained for geologic logging and laboratory chemical analysis. The samples will be screened using a PID. Based either on results of field screening or visual observations, two soil samples will be selected for chemical analysis from each boring. Specific criteria for selecting analytical soil samples will include but are not limited to visually observed contamination (e.g., soil discoloration), unusual odors, and elevated PID readings. Upon completion or termination, the boring will be backfilled with bentonite/cement grout as required by USATHAMA Geotechnical Requirements (Paragraph III.A.11).

The PID meter will be calibrated to 100 ppm isobutylene during each day of sampling activities. Calibration of the PID will be in accordance with the manufacturer's suggested procedures.

The subsurface soil samples will be collected in accordance with procedures contained in the QC Plan (Jordan, 1990), APSP (Jordan, 1990), and the USATHAMA Quality Assurance Specifications (1987). The sample device will be opened and screened with a PID and the recovery will be measured. The sample will then be collected and documented, employing the following procedures:

- Scan the soil with a PID and record measurements

- Remove the portions(s) of the sample selected for chemical analysis and place it (them) into appropriate containers using a clean spatula. Soil intended for VOC analysis will be placed in glass vials with septum caps and capped as quickly as possible. The containers will be filled as near to capacity as practicable to minimize volatilization of the sample into the container headspace.

- Place a portion of the sample in an 8-ounce "reference soil jar," cover the jar opening with aluminum foil, and then cap the jar. This sample portion will be used for headspace PID measurements. These measurements will be made in the field and recorded on each boring log. Samples will be allowed to equilibrate for approximately 20 minutes at ambient temperature, at which time the jar cap will be removed, the PID probe will be inserted through the aluminum foil, and a PID reading will be taken on the headspace air in the sample jar. The highest reading that is immediately measured will be recorded for each sample. The headspace measurements provide a relative indication of the presence or absence of VOCs in the sample. This information, when used in conjunction with the laboratory analytical results, will be useful in interpreting the distribution of soil contamination at the site.

- Visually examine the sample and record its characteristics using the USCS (e.g., texture, color, consistency, moisture content, layering, and other pertinent data).

- Discard any excessively disturbed or loose material found in the sampler which may not be representative of the interval sampled. This material will be discarded with boring spoils at each boring location.

- Decontaminate the sampling device by steam-cleaning and/or scrubbing with clean, potable water from the approved water source.

3.3.2 Sediment Sampling Procedures

One sediment sample from the septic tank will be collected for chemical analysis using a long-handled scoop or spade. Prior to collecting the sample, the sampling equipment will be scrubbed and rinsed with clean, water from the approved source. The sample will be collected with minimal disturbance and bottled quickly to prevent loss of volatile constituents. Clean, inert equipment (e.g., clean, disposable stainless steel spatulas) will be used to handle samples. The proposed location of the sediment sample is shown on Figure 2.

Details of sample containers, sample volumes, and preservation techniques are given in the MARC QC Plan (Jordan, 1990). A summary of these parameters is presented in Section 3.3.4.

At the time of sediment sampling, the following data will be noted and recorded in the field notebook:

- o Site number or location
- o Date
- o Time (24-hour system)
- o Antecedent weather conditions
- o Pertinent observations (e.g., depth, color, and odor)
- o Signature of sampler and date.

The sediment sample will be carefully labeled so it can be identified by laboratory personnel. The sample label will include the project number, sample number, time and date, and sampler's initials. All samples will be identified immediately after collection with non-water-soluble ink on a standard preprinted label. Information concerning preservation methods and sample location also will be included on the label. The sediment sample will be stored and shipped in a cooler and will be kept at 4 degrees Celsius from time of sample collection until analysis.

3.3.3 Ground Water Sampling Procedures

The MARC FSI will include two rounds of ground water sampling of the wells MW-7, MW-8, MW-9, and MW-10. The sampling rounds will be at least 30 days apart and the first round will be collected 14 days after completion of monitoring well development (to ensure that undisturbed ground water conditions are encountered and representative samples are obtained). The first round of sampling will also include samples from existing Monitoring Wells MW-2B, MW-3, MW-4, MW-5, and MW-6. Ground water sampling will be performed in accordance with the requirements of the USATHAMA QA Plan (1987), the MARC QC Plan (Jordan, 1990), and the WDNR Groundwater Sampling Procedures Guidelines (1987).

Sampling of monitoring wells will proceed from upgradient (i.e., background) wells to downgradient wells. Sampling equipment, including bailers, pumps, and tapes will be decontaminated prior to initial use and before each successive use. Discharge lines and ropes will be replaced for each well if used. Water used for decontaminating and rinsing field equipment will be distilled/deionized (DI) water or water from the USATHAMA-approved source, and in no instance will detergents, soaps, or solvents be used to clean equipment in the field. An equipment rinse blank will be included with each round of ground water samples and analyzed for the required parameters to ensure that adequate decontamination has been performed. This will be the QA/QC sample for each round of water sampling. Sampling equipment will be protected from ground surface contamination by the use of new, clean, plastic sheeting at each well. The sheets will be properly disposed of after use at each well.

The ground water sampling methodology for the MARC FSI is outlined in the following subsections. All information gathered during ground water sampling (e.g., pH, specific conductivity, purge volumes) will be recorded at the time of sampling on the Water Sample Field Collection Report (see Appendix A).

3.3.3.1 Pre-Purging Activities

- Check the well for proper identification and location.

- Measure and record the height of protective casing.

- After unlocking the well and removing any well caps, measure and record the ambient and well-mouth organic vapor levels using the PID. If readings above background are detected in the breathing zone, the sampler will utilize the appropriate safety equipment as described in the APSP (Jordan, 1990).

- Measure and record the distance between the top of the well and the top of the protective casing.

- Using the electronic water level meter, measure and record the static water level from the top of the well and the depth to the well bottom to the nearest 0.01 foot. Upon removing the water level meter, rinse it with water from the approved source or distilled water.

- Calculate the volume to be purged using the following formula (assuming a 2-inch I.D. monitoring well and a 6-inch-diameter borehole):

$$\text{Total Purge Volume} = \left[\text{Bottom Depth (ft)} - \text{Static Water Level (ft)}\right] \times 0.163\ \text{gal/ft} +$$

$$\left[\text{Area of Borehole } (ft^2) - \text{Area of MW } (ft^2)\right] \times \text{Depth of Sand Pack (ft)} \times$$

$$\text{Sand Pack Porosity (0.30)} \times 7.48\ gal/ft^3 \times 5\ \text{(Volumes)}$$

- o Record water-level information and pre-purging data on the Water Sample Field Collection Report.

Following the measurements and calculations, sampling will commence in the following sequence, utilizing the appropriate purging technique.

3.3.3.2 Purging and Sample Collection

- o In all shallow water table wells, place the pump or hose intake at the top of the water column and begin purging. During the 5-volume purge cycle, lower the pump or hose intake to the bottom of the well. This will ensure that all stagnant standing water from within the well screen and sand pack is removed prior to sample collection, and that a representative sample is collected from the entire screened interval.

- o In the deep aquifer wells, place the pump or hose intake at the static water level and begin purging 5 well volumes. During the 5-volume purge cycle, lower the pump or hose intake to the screened portion of the well and continue purging. This action will ensure that stagnant ground water within the well riser, the screen, and sand pack is removed prior to sampling. In both water table and deep aquifer wells, low permeability formations may require the pumping rate to be reduced so as not to stress the formation and induce hydraulic gradients. In this situation, pumping rate will be reduced to allow the 5-volume purge without depressing the water level drastically. If the pumped flow rate drops below 1 gpm, USATHAMA will be notified to discuss modifications to the standard purging procedures.

- o Purging is considered complete when five well volumes, as calculated in Item 6 (see Pre-purging Activities), have been purged. For wells in low permeability locations, i.e., less than 1 gpm recharge, the well will be purged by a modified procedure approved by USATHAMA. For slow recharge wells, the well will be pumped dry, allowed to recover, pumped dry again, and the sample collected. A slow recharge well is defined as any well that requires four or more hours for recovery. Use of this procedure will also be coordinated with USATHAMA.

- Record the in-situ parameters (e.g., pH, specific conductance, and temperature) on the Water Sample Field Collection Report.

- After purging, lower a bailer to the bottom of the screened interval or midpoint of the static water level.

- Collect the sample(s) in appropriate containers. Samples will be placed directly from the bailer into the appropriate containers. VOC sample containers will be filled with as little agitation as possible, and are completely filled so that no headspace or air bubbles exist in the vial.

- Remove the bailer from the well and decontaminate by scrubbing and rinsing with water from the approved source.

- An equipment blank containing DI water will be included in both rounds of ground water samples.

- Record sampling data on the Water Sample Field Collection Report.

- Secure the well cap and lock.

It is anticipated that ground water purge water will also be collected and stored in labeled drums. If laboratory analyses indicate chemical concentrations below WDNR health-based criteria, the purged and development water will be discharged to the ground surface at the site or to the storm water system.

The products of monitoring well sampling are as follows:

- Ground water samples from each well

- On-site measurements of conductivity, temperature, and pH

- Depth to static water level at each well.

3.3.4 Sample Management/Chain-of-Custody

The environmental sample chain-of-custody (COC) and management procedures to be used at MARC during the FSI are described in the following subsections.

3.3.4.1 Chain-of-Custody

To assure that all environmental samples are accounted for at all times, OHM will follow the USATHAMA CHAIN-OF-CUSTODY PROCEDURES (1987) described in the QC Plan (Jordan, 1990) during sampling events.

As the field sampling team collects each sample, the labels will be completed and affixed to each sample bottle. Clear plastic tape will be placed over each sample label to preserve the information on the label and protect it from alteration. Once the sample label is affixed to the sample bottle, appropriate field data records will be completed. Sampling personnel will initiate sample custody records in the field at the time samples are collected. This COC record will be used to document handling procedures, including sampling site, sample number, number and types of containers corresponding to each sampling site, and the person collecting and shipping the samples. Additionally, the COC record describes the sample and documents the COC including names of responsible individuals and dates and times of custody transfers.

3.3.4.2 Sample Staging/Shipping

The OHM hydrogeologist/geologist will oversee the collection of subsurface soil, sediment, and ground water samples during the MARC FSI. Samples will be collected as described in Sections 3.3.1 through 3.3.3, and labeled and COC-initiated as described in the COC section above.

At the end of each day, samples from the MARC site will be logged in, and associated data records and COC forms will be checked for completeness. After review, data record sheets will be initiated and dated. COC forms will be signed and dated.

Samples will be checked for integrity and lid closure to prevent leakage. Sample labels will be checked for completeness and integrity. Any leaking samples or other situations which may compromise sample data will be noted in the sample log and reported to the Project QA Manager and the COR.

Prior to shipment, sample bottles will be tightly packed to avoid breakage during shipment. Ice packs will be used to cool the samples during shipment to the WDNR and USATHAMA-approved analytical laboratory. Samples will be shipped to

Pace, Inc., the analytical laboratory via Federal Express; in no case will samples for analytical chemical analysis be allowed to remain in temporary storage at the MARC sample staging area for more than 48 hours. The original COC form will be packaged in a Ziploc bag and will accompany the samples during shipment to the laboratory.

3.3.4.3 Sample Preparation and Establishment of Lots

Ground water, soil, and sediment samples from the MARC FSI that will receive laboratory analysis will be prepared and established into lots according to USATHAMA QA requirements. The field sampling program and shipment of samples will be coordinated to ensure that minimum lot size requirements are met and that holding times are not exceeded for any analysis.

Field QC samples will consist of one VOC equipment blank per ground water sampling event. The equipment blank will consist of DI water contained in glass VOC bottles that were run across the sampling equipment after cleaning. Analysis of the equipment blank for VOCs will indicate if sampling equipment has been properly cleaned.

Chemical analysis methods for the MARC FSI fall into QC Class C1 under the designations of the USATHAMA QA Plan. Specific laboratory QC requirements for these methods are outlined in Section 4.2 of the Sampling Design Plan.

3.3.4.4 Chemical Analyses Holding Times, Containers, and Preservation

The soil, sediment, and ground water samples will be analyzed for EPA's volatile halocarbons list (see Table 3). Samples will be containerized in glass vials with Teflon-lined septum. The maximum holding time for volatile halocarbons is 14 days.

Samples shipped to the subcontractor laboratory will be kept cold during shipment. Samples stored at the subcontractor laboratory will be stored at 4 degrees Celsius until analysis. The Project QA Manager will monitor the chemical analysis and sampling effort to assure compliance with holding time and preservation requirements. Any problems will be identified by the Project QA Manager to the Task Manager, and the appropriate corrective action will be instituted.

The cleaning procedures conducted by the laboratory for the containers is:

- o Thoroughly wash container with hot detergent and water
- o Triple rinse with tap water
- o Triple rinse with DI water
- o Air-dry
- o Bake at 200 degrees Celsius for 2 hours
- o Soak septa for several hours in methanol
- o Bake at 100 degrees Celsius for 10 to 15 minutes.

3.4 SAFETY

All OHM's field activities will be conducted in accordance with the approved APSP (Data Item A009) for MARC. Adherence to the approved APSP will be enforced by the Health and Safety Office (HSO) or designee, who will be on-site during each site activity.

On-site OHM and subcontractor personnel will be appropriately trained, and will be currently enrolled in a Health Monitoring Program so as to comply with the Occupational Safety and Health Administration (OSHA).

TABLES

TABLE 1
MONITORING WELL AND SOIL SAMPLING
INFORMATION AND RATIONALE

MONITORING WELL/ TEST BORING ID	PROPOSED LOCATION	ESTIMATED TOTAL DEPTH	SCREEN LENGTH	RATIONALE/COMMENTS
MW-7	East (downgradient) of septic tank and drainfield. On Silver Creek Park property.	30 feet	15 feet	Shallow well in a 2-well cluster (MW-8) downgradient of MW-6 screened in the shallow water table to determine if 1,2-dichloroethane (confirmed from a MARC well) has migrated off site toward Collector Well "B"
MW-8	East (downgradient) of septic tank and drainfield. On Silver Creek Park property.	90 feet	15 feet	Deep well in 2-well cluster (MW-7) screened at the same elevation as Collector Well "B" to determine whether MARC is the source of TCE at Collector Well "B"
MW-9	Downgradient of vehicle wash rack and seeps. On Silver Creek Park property.	90 feet	15 feet	Deep well screened at the same elevation as Collector Well "B" downgradient of MW-3 and MW-4 to determine whether MARC is the source of TCE at Collector Well "B"
MW-10	East of septic tank and drainfield on MARC property next to MW-6	120 feet	15 feet	Deep well in a 2-well cluster (MW-6 shallow) screened at the same elevation as Collector Well "B" to determine if 1,2-dichloroethane has migrated into deep zone and whether MARC is the source of TCE at Collector Well "B"
Soil-1	Drainage Field	5 feet	N/A	Determine if the septic system is the source of 1,2-dichloroethane
Soil-2	Drainage Field	5 feet	N/A	Determine if the septic system is the source of 1,2-dichloroethane
Soil-3	Septic Tank	Bottom 'of tank	N/A	Determine if the septic system is the source of 1,2-dichloroethane

TABLE 2

ESTIMATED DRILLING AND MONITORING WELL INSTALLATION QUANTITIES

ITEM/DESCRIPTION	QUANTITY DESCRIPTION	ESTIMATED QUANTITY
1. Drill borehole for monitoring well installation		
A. Overburden drilling with sampling at 5-foot intervals, 6-inch borehole(1)	90 feet x 2 wells 120 feet x 1 well 30 feet x 1 well	330 feet
2. Monitoring well installation		
A. 2-inch PVC well screen (SCH 80, machine-slotted, 0.010-inch slot size)	15 feet x 3 wells	45 feet
B. 2-inch PVC well screen (SCH 40 machine-slotted, 0.010-inch slot size)	15 feet x 1 well	15 feet
C. 2-inch PVC riser (SCH 80)	75 feet x 2 wells 105 feet x 1 well 15 feet x 1 well	255 feet
D. 2-inch PVC riser (SCH 40)	15 feet x 1 well	15 feet
E. Sand filter pack (30/40 sand)	17 bags x 4 wells	68 bags
F. Bentonite slurry or pellet seal	5 feet x 4 wells	20 feet
G. Cement-bentonite grout	17 bags x 4 wells	68 bags
3. Protective Casing		
A. Protective casing	1 casing x 4 wells	4 casings
B. Guard posts	4 posts x 4 wells	16 posts
C. Gravel pad (4 feet x 4 feet)	1 pad x 4 wells	4 pads

Notes:

(1)Drilling method of borings for monitoring well installation 4 1/2-inch hollow-stem augers. If large boulders are encountered, wash rotary will be utilized.

TABLE 3

VOLATILE HALOCARBONS LIST

COMPOUND	USATHAMA TEST NAME
Volatiles	
Chloromethane	CH3CL
Bromomethane	CH3BR
Vinyl Chloride	C2H3CL
Chloroethane	C2H5CL
Methylene Chloride	CH2CL2
1,1-Dichloroethene	11DCE
1,1-Dichloroethane	11DCLE
Chloroform	CHCL3
1,2-Dichloroethane	12DCLE
1,1,1-Trichloroethane	111TCE
Carbon Tetrachloride	CCL4
Bromodichloromethane	BRDCLM
1,1,2,2-Tetrachloroethane	TCLEA
1,2-Dichloropropane	12DCLP
trans-1,3-Dichloropropene	T13DCP
Trichloroethene	TRCLE
Dibromochloromethane	DBRCLM
1,1,2-Trichloroethane	112TCE
cis-1,3-Dichloropropene	C13DCP
2-Chloroethyl Vinyl Ether	2CLEVE
Bromoform	CHBR3
Tetrachloroethene	TCLEE
Chlorobenzene	CLC6H5
1,2-dichloroethene	12DCE

USEPA Method No. 8010

USATHAMA Method No. LG03

FIGURE

PLOT SCALE: 1" = 1"

	OHM CORPORATION PITTSBURGH, PA	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER 10918–A1
		B.O'Connor	7–30–91					

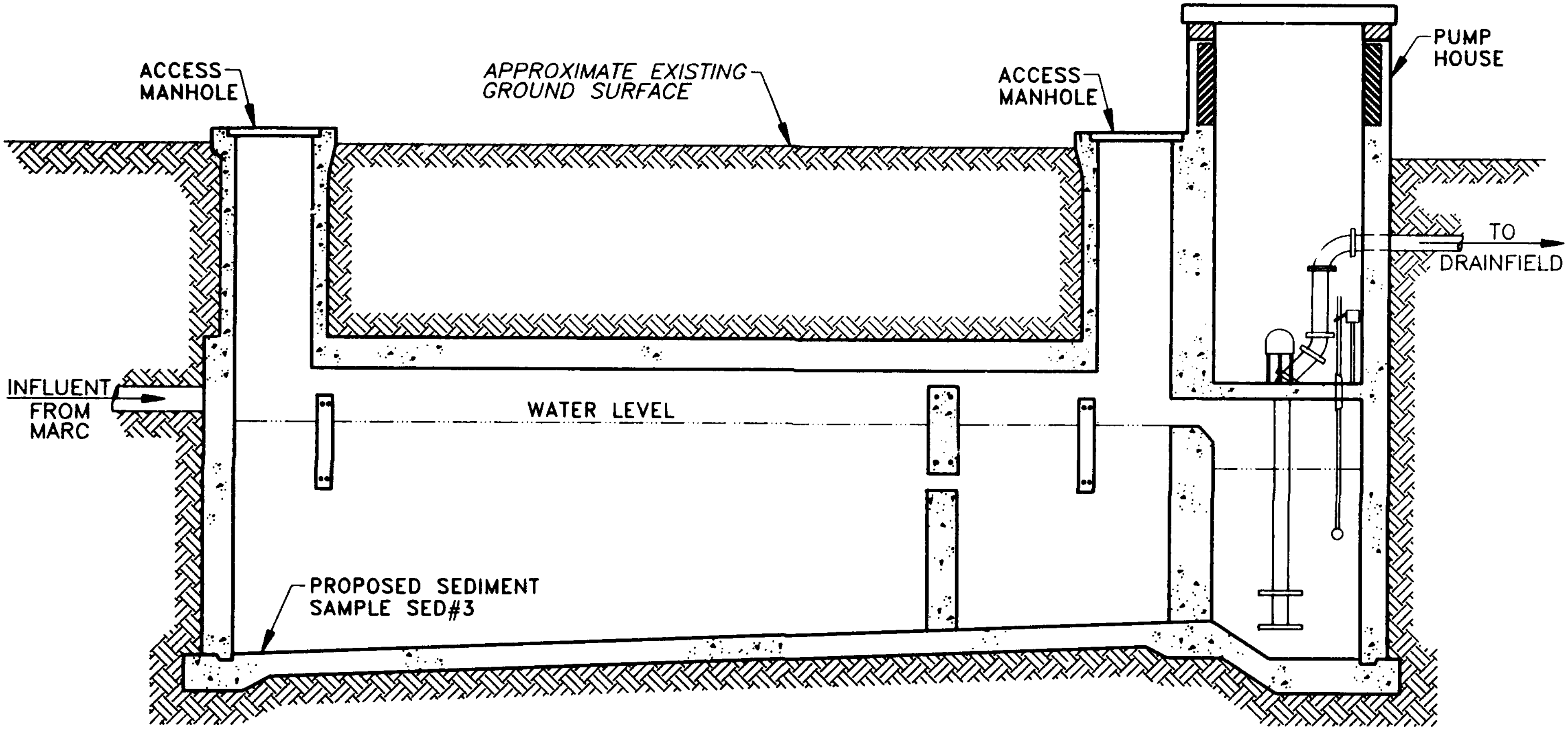


FIGURE 2

SEPTIC TANK SAMPLING LOCATION
MANITOWOC ARMY RESERVE CENTER
MANITOWOC, WISCONSIN

PREPARED FOR

USATHAMA
ABERDEEN PROVING GROUND, MARYLAND

OHM Corporation

REFERENCE:
CROSS SECTION PREPARED FROM MARC DRAWING NO. 71–08–84, SHEET 2 OF 2.

APPENDIX A

FIELD FORMS

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Other ______________

SOIL BORING LOG INFORMATION
Form 4400-122 7-91

Page ____ of ____

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
	_ _ _ _ _ _ _	

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
	__ __ / __ __ / __ __ M M D D Y Y	__ __ / __ __ / __ __ M M D D Y Y	

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
_ _ _	_ _ _ _ _ _		______ Feet MSL	______ Feet MSL	______ inches

Boring Location
State Plane ______________ N, ______________ E S/C/N | Lat ____ ____ ____
______ 1/4 of ______ 1/4 of Section ______, T ______ N, R ______ E/W | Long ____ ____ ____

Local Grid Location (If applicable)
☐ N ☐ E
______ Feet ☐ S ______ Feet ☐ W

County	DNR County Code	Civil Town/City/ or Village
	____ ____	

Sample									Soil Properties					
Number	Length Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments

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

Signature	Firm

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats.

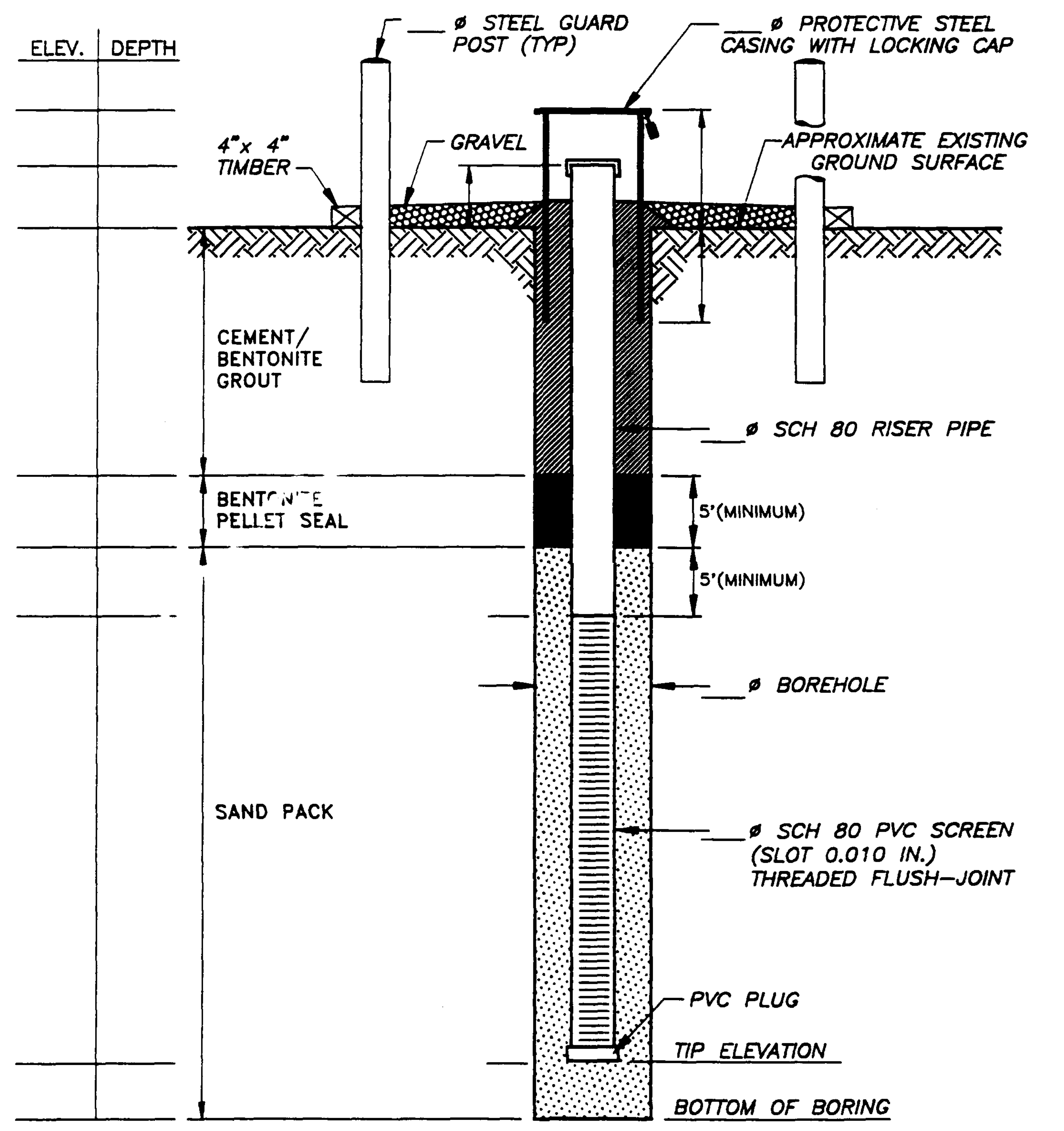
OHM Corporation

MONITORING WELL INSTALLATION DETAIL (ABOVE GROUND)

Project Number____________________

Project Name____________________

Monitoring Well Number____________________



NOTES: ____

OHM Corporation

WATER SAMPLE FIELD COLLECTION REPORT

Project Number ____________
Project Name ____________
Site Location ____________

Sample ID Number ____________
Sample Location ____________
Diameter of Well ____________ (in.)
Depth to Bottom of Well ____________ (ft.)
Static Water Level ____________ (ft.),
Well Volumes Purged ____________,
Type of Sample (3) ____________,
Depth of Sample ____________ (ft.),
Sample Collection Order ____________

Date Collected ____________
Time Collected ____________
Collected By ____________
Casing Stick Up ____________ (ft.)
Measured From (1) ____________
Purging Method (2) ____________
Sampling Method (4) ____________
Measured From (1) ____________

FIELD MEASUREMENTS

Water Temperature ____________ pH ____________
Specific Conductance ____________ umho/cm at ____________ (Temperature)
Other ____________

METER CALIBRATION

pH STD	METER READING	SP. COND. STD	METER READING	______ /STD	METER READING

SAMPLE TYPES COLLECTED

TYPE (5)	VOLUME	FILTERED		PRESERVATION (6)	
______	______	Y ☐	N ☐	Y ______	N ☐
______	______	Y ☐	N ☐	Y ______	N ☐
______	______	Y ☐	N ☐	Y ______	N ☐
______	______	Y ☐	N ☐	Y ______	N ☐
______	______	Y ☐	N ☐	Y ______	N ☐

Number of Containers ____________
Date Received by Lab ____________ Laboratory ____________
Remarks: ____________

(1) T.O.C.=Top of Protective Casing; T.O.W.=Top of OF Well Casing; G.S.=Ground Surface
(2) Bailed, Pumped, Air Lift, Etc.
(3) Stream, Pond, Spring, Well, Seep, Supply, Etc.
(4) Bailer, Kemmerer, Grab, Pump, Etc.
(5) General Chem., Metal, VOA, Organics, Etc.
(6) HNO^3, NaOH, H^2SO^4, $Na^2O^3S^2$, Etc.

F-117A 3/2/90

APPENDIX B

STANDARD OPERATING PROCEDURES FOR CONTAINERIZATION, STORAGE, SAMPLING, AND DISPOSAL

STANDARD OPERATING PROCEDURES FOR CONTAINERIZATION, STORAGE, SAMPLING, AND DISPOSAL (DRAFT)

The following Standard Operation Procedures (SOP) will be used by OHM during the Follow-On Site Investigation at the Manitowoc Army Reserve Center.

CLASSIFYING/HANDLING SOIL CUTTINGS AND DECONTAMINATION LIQUIDS

Assumptions

Possible contmainants in the soil cuttings/decontamination liquids/ground water are limited to volatile organics only.

Screening

- Soils will be screened using a photoionization detector (PID); any materials exceeding 10 ppm will be containerized and further tested as described below.

- PID instruments will be calibrated at least daily in accordance with manufacturer's directions.

- PID readings will be obtained from a field headspace analysis procedure as described below:

  - Samples will be placed in glass containers, the container mouth will be covered with aluminum foil and capped.

  - Samples will be allowed to stabilize at a temperature of at least 20 degrees Celsius (68 ^{o}F) for at least 45 minutes.

  - The sample container lid will be removed, exposing the inner aluminum foil cover. The foil cover will be pierced with the PID probe to measure the total volatile organic concentration in the sample headspace.

  - The sample will be composited from the split-spoon samples obtained for each 5-foot interval. Soils from the borings will be segregated in separate piles corresponding to each boring until PID analyses are obtained for classification.

Material Handling

- Soils exceeding 10 ppm PID readings will be containerized for further testing. Soils are to be in separate piles on plastic and then covered with plastic.

- Decontamination liquids are to be consolidated in 55-gallon labeled drums.

- Purged water will be pumped directly from the wells into 55-gallon, labeled, metal drums for temporary storage. Water from each well will be stored in separate drums.

- Drums of containerized material will be placed for temporary storage within the fenced area adjacent to the POL storage shed as directed by the USATHAMA Project Officer.

Confirmatory Testing

- Soil which failed the PID screening criteria will be sampled IAW USEPA methods (SW-846), and analyzed for EPA's Volatile Halocarbons List.

- Soil which exceeds or meets WDNR's action levels for volatile halocarbons will be analyzed for the hazardous waste characteristics as required by the disposal facility which may include:

  - TCLP
  - Ignitability
  - Corrosivity
  - Reactivity.

- Decontamination liquid will be sampled IAW USEPA methods (SW-846), and analyzed for EPA's Volatile Halocarbons List.

- The ground water sample analyses (EPA's Volatile Halocarbons List) will be used to characterize the drummed purged water from each well.

- If analyses indicate ground water is "clean" according to WDNR, the purged water can be discharged on the MARC site pending necessary WDNR permits.

- o If analyses indicate the drummed decontamination liquid is "clean" according to WDNR, the decontamination liquid can be discharged on the MARC site.

- o If analyses indicate ground water/decontamination liquid is contaminated, the contamination levels will be reviewed by WDNR to determine type of treatment required and the location for disposal.

<u>Handling Containerized Materials</u>

- o OHM will arrange transportation and disposal of these materials according to State and Army regulations.

<u>Responsibilities</u>

- o OHM will be responsible for providing material, labor, and equipment necessary to perform, and for performing, the requirements of the SOP, including:

  - All PID sampling and screening

  - Containerization and providing containers

  - Transportation of containerized materials on MARC

  - Sampling and analyses for waste characterization

  - Numbering and labeling samples and containers in a manner that will assure correlation of laboratory results with the corresponding container, well/boring number, and SA/AOC number from which the sample was obtained

  - Timely transmittal of analytical results (including PID results) to USATHAMA and MARC within a maximum of 45 days from the date of sample collection.

  - The proper transportation and disposal of wastes generated and handled as described above.