

DPT/MIP Investigation Scope of Services

An investigation will be performed using direct push technology (DPT) and membrane interface probe (MIP) analysis to close data gaps within the site conceptual model (SCM). These data gaps prevent adequate definition of a technical remediation approach for closure of the Site. Investigation activities at the Site identified soil and groundwater contaminated with chlorinated volatile organic compounds (CVOCs) primarily consisting of tetrachloroethene (PCE) in the vicinity of the former electronics manufacturing waste sumps building. PCE and cutting oil were reportedly used in the manufacturing operations.

This scope of services describes the data objectives, the dynamic sampling and analysis plan, analytical methods, and quality assurance (QA), quality control (QC), and health and safety protocols. Contractor requests the services of a drilling Subcontractor, herein referred to as "Subcontractor" to support this work.

1. Instructions to Bidders

Completed Bids should be sent via email or facsimile to the attention of Contractor by 5 pm MST on Wednesday, March 9, 2004.

The Subcontractor should provide all costs necessary for successful completion of the work, and all assumptions used in the development of the cost estimate. Costs should include all labor, expenses, mobilization/demobilization costs, an estimated time required to complete work, and equipment rental and standby rates. Costs should be submitted on the attached Bid Form with any additional supporting documentation required.

The field work is expected to be conducted during the month of July 2005. Subcontractor shall provide whatever resources necessary to complete the Scope of Services within the timeframe presented in the final project schedule. The proposed site operations are 7:00 am to 5:00 pm Monday through Friday. Bidders shall submit a project schedule as part of their bid. Bidders are requested to state in their Bid the estimated duration of performing the various activities required for completing the work, including all submittals, and the total estimated duration of performing the total project.

2. Investigation Objectives

Specific objectives were identified to reduce uncertainties in the SCM and to meet the overall project goals. Consistent with the identified SCM data gaps, the following are the data objectives for this field investigation:

- Delineate the vertical and horizontal extent of the source of PCE contamination
- Evaluate the potential for the presence of DNAPL at the bedrock interface
- Gather additional lithologic information to improve understanding of the bedrock interface with the saturated sand and gravel zone

- Assess the need for additional investigation of the hydraulic and contaminant conditions in the bedrock zone
- Collect conceptual design information for potential application of an in situ chemical oxidation remedy
- Assess the potential for additional sources of contamination

The field activities required of the Subcontractor will be discussed in forthcoming sections of this scope of services.

3. Sampling and Analysis Strategy

The field investigation will utilize a dynamic approach which incorporates the use of a real-time MIP survey for in situ VOC measurement and select fixed-base laboratory sample analysis to efficiently and cost-effectively achieve the investigation objectives. This section describes the activities that will be conducted for the field effort and presents the adaptive sampling and analysis strategy to effectively respond to site conditions as they are encountered.

3.1 Investigation Locations and Rationale

The anticipated sample locations for the investigation are shown on **Figure 1**. The limit of this investigation has been set to on-site areas only. No off-site investigation will be performed as part of this effort. If data collected from this effort suggests contaminants are migrating into the site from off-site sources, then the need for additional off-site investigative efforts will be evaluated as a follow-up to this work.

Sampling locations have been divided into "Investigation Areas" for planning purposes only. The rationale for selection of the Investigation Areas is as follows:

Investigation Area 1 – This is the location of two former waste sumps and an area where previous excavation occurred. However, contamination was left in-place as noted by observations of "black-stained soil" at the edge of the excavation and a highly elevated PCE concentration in soil (640 milligrams per kilogram) at the base of the excavation.

Investigation Area 2 – This is the location of a recently identified catch basin of unknown former use, but of apparent similar construction to the former shallow sump that was found to contain waste materials and was removed from Investigation Area 1 in March 1994.

Investigation Area 3 – This is the vicinity of an old-age sewer line (currently in service) that runs along the south side of the site and outside of the slurry containment wall. Persistent levels of PCE remain in monitoring well PZ-3 (81 micrograms per liter in July 2004) despite a general reduction in site-wide contaminant concentrations.

Investigation Area 4 – This area encompasses the southern half of the upgradient property boundary (west side of the site) where limited groundwater contaminant assessment has been performed. Data collection from this area is critical for understanding of the potential for contaminant migration from off-site, upgradient sources.

Investigation of all Areas will be performed using a MIP survey. The level of effort of the MIP survey in each Area will be as governed by field conditions and levels of contamination encountered. **Figure 1** shows a potentially more extensive MIP survey grid in Investigation Areas 1 and 2 due to higher anticipated contaminant concentrations and a greater extent of contamination which will require dynamic field decision making. For planning purposes, it was assumed that VOC concentrations within Investigation Areas 3 and 4 will be low enough that the MIP tools may not be able to detect it. Therefore, as illustrated on **Figure 1**, the investigation in these areas is expected to consist of a small number of MIP probe points and a larger proportion of DPT soil and groundwater samples.

3.2 Field Decision Making Logic (Decision Criteria)

The decision logic driving this source investigation is summarized on a flow chart included as **Figure 2**. The decision logic is intended to prescribe the approach that will be utilized to determine MIP survey and additional DPT investigation locations. It is designed to be utilized by field personnel to guide daily activities and bound the extent of the investigation. It is also designed to be applicable for all Investigation Areas. As mentioned above, **Figure 1** depicts the initial and possible follow-up investigation locations, but the decision logic in **Figure 2** will be used to define the exact MIP points beyond the initial four points shown for Investigation Areas 1 and 2 and the initial single MIP points shown for Investigation Areas 3 and 4.

The decision logic begins with the initial MIP data, incorporates continuous evaluation of the data manually and using 3D kriging software to visualize the contaminant plumes as more data is collected and the plume shape becomes more extensive and complex. The electron capture detector (ECD) on the MIP tool will be used as the primary data for decision making since it is optimum for PCE contamination delineation (see **Section 3.4.3**). To bound the scope of this investigation, threshold ECD response values of 2×10^5 and 1×10^6 millivolts (mV) were conservatively selected as indicative of moderate and high levels of in situ PCE contamination, respectively, for source delineation purposes. The objective of this investigation will be to bound the moderate levels of PCE contamination and identify zones of potential DNAPL where exceedingly high ECD response can be expected.

Figure 2 shows that the investigation progresses by stepping out radially from the center of each Investigation Area until the contamination is bound laterally to within 10 feet (i.e., 20-foot MIP spacing) and to within 1 foot vertically. The proximity of the Building may restrict the ability to meet this delineation objective. While MIP access to the Building is possible, it is limited. All efforts will be made to work with the Owner to complete delineation of the source area(s), but it must be acknowledged that the Building may hinder the success of the delineation effort if the source area is found to lie beneath the building footprint. In all situations, a MIP log containing all ECD values less than 2×10^5 mV will be obtained to bound the source area(s) even if the boundary point is located on the other side of the building.

The vertical boundary of this investigation has been set to the refusal depth of DPT rig. As prescribed on **Figure 2**, if high ECD response and increasing levels of contaminants are found to exist at the refusal depth of the MIP tools, then bedrock interface conditions will be further evaluated to the extent practicable with the DPT rig and the need for a bedrock investigation considered at that time.

4. Field Methods

This section describes the field methods to be used for this investigation.

4.1 Membrane Interface Probe (MIP) Survey

The MIP technology will serve as the primary screening tool for delineation of the subsurface source of PCE in groundwater and soil. The MIP tool can detect the presence of VOC contamination using three detectors: flame ionization detector (FID), photo ionization detector (PID), and the ECD. The following contaminants can typically be detected:

- Straight-chained hydrocarbons (best detector is FID)
- Aromatic hydrocarbons (best detector is PID)
- Chlorinated compounds (best detector is ECD)

A heated probe carrying a permeable membrane is advanced to depth using a DPT rig, where subsurface contaminants diffuse across the membrane and enter into a carrier gas stream within the probe. The probe is heated to accelerate diffusion of contaminants, which occurs due to a concentration gradient between the contaminated matrix (soil gas, soil, and/or groundwater) and the clean carrier gas directly behind the membrane within the probe. The carrier gas sweeping behind the membrane, transports the contaminants through a trunk line and to the gas-phase detectors at the ground surface for measurement.

The rate of MIP advancement is dependent upon the presence and magnitude of contamination. To obtain an accurate in situ VOC measurement, the MIP probe must set still at the depth interval for a minimum amount of time equal to the travel time of carrier gas from the downhole detector to the analytical detectors in the above-grade mobile “lab”. All efforts will be made to expedite the MIP survey by expediting advancement (i.e. 4- to 5-foot advancement intervals) through uncontaminated overburden and focusing MIP “stops” at 1-foot intervals only within the contaminated zones. The initial probe locations at each Investigation Area will be “stopped” more frequently to gain a baseline understanding of the geometry of the contamination before making field decisions to expedite the effort, however.

MIP data (ECD, PID, FID, probe temperature, electrical conductivity, and probing speed versus depth) will be delivered electronically by the subcontractor to Contractor daily on compact disk or via email. The MIP data will then be analyzed as discussed in Section

4.2 Soil Sampling

Soil samples will be collected using DPT for MIP confirmation, contaminant characterization, lithologic description, and natural oxidant demand (NOD) test purposes.

Immediately following completion of the MIP survey and data reduction, soil samples will be collected from a small subset of the MIP survey locations for confirmation/calibration of the detector response. Contractor will determine the exact sampling locations after detailed review of the MIP survey results. The goal will be to perform confirmation soil sampling at approximately three to five percent of the equilibrated MIP measurements locations with the primary goal of analyzing soil within zones of low to highest detector response, zones at the bedrock interface, and anomalous measurement zones. Discrete soil samples will be

collected using a Geoprobe Macro-Core® sampling device at select location and depth intervals by coring with the DPT rig. The soil sampling points will be placed as close as possible to the original MIP measurement point (generally within a distance of 12 to 18 inches). The MIP confirmation/calibration samples will be analyzed for VOCs by EPA Method 8260. Select soil samples may also be analyzed for total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons if visual observations and/or the MIP PID/FID detectors indicate its potential presence.

Soil samples will also be collected for lithologic description as shown on **Figure 1** in Investigation Areas 3 and 4. Soil samples for lithologic description will be collected using the Geoprobe Dual Tube soil sampling system. The benefit of using the Dual Tube sampling device is that continuous soil samples may be collected from the same boring without the need to re-push the DPT sampling rods for each sample collection interval. Soil samples from these locations will be collected continuously from ground surface to DPT refusal at the bedrock interface. No laboratory analytical will be performed on these samples from Investigation Areas 3 and 4 unless the MIP response indicates elevated contaminant concentrations.

Two soil samples for NOD testing will be collected from a location within Investigation Area 1 or 2. The exact location of the NOD samples will be determined by the Contractor engineer upon completion of the MIP survey. One is intended to be representative of the sand and gravel formation and the second representative of the weathered bedrock. The results of the NOD testing will be used to screen the applicability of in situ chemical oxidation (ISCO) for treatment of the contaminant source zone. Due to the large volume of soil needed for the suite of testing to be performed on these samples, a large diameter Geoprobe Macro-Core sampling device will be utilized (minimum 3-inch diameter). A minimum 5-foot length of soil sample volume will be required from each sample location to collect enough soil for the laboratory analyses. In addition to the NOD analysis at each depth, soil samples will be analyzed for VOCs by EPA Method 8260, total organic carbon (TOC), grain size analysis including hydrometer analysis for silt and clay fraction definition, bulk density, and porosity. Grab samples for VOC analysis will be taken from the midpoint of the first core that is retrieved from each depth at the first sampling point at each location (VOC samples will not be composited). Samples for NOD, TOC, grainsize, bulk density, and porosity analysis will be taken from the remaining sample volume that is homogeneously mixed in a decontaminated stainless steel bowl.

All soil samples will be logged using the Unified Soil Classification System (USCS) by an on-site Contractor geologist. After lithologic logging is complete on each core, headspace analysis for VOCs will also be conducted at a minimum of one depth interval per sample core and at other depth intervals that exhibit contaminant accumulations. All field observations and descriptions will be recorded on a soil boring log form.

Upon completion of soil sampling, borings will be grouted by the Subcontractor from the bottom up to plug it (see **Section 3.6** for details of borehole abandonment).

4.3 Groundwater Sampling

Two types of DPT groundwater sampling will be performed for this investigation effort; groundwater sampling for MIP confirmation and plume delineation.

Immediately following completion of the MIP survey and data reduction, groundwater samples will be collected from a small subset of the MIP survey locations for confirmation/calibration of the detector response. Contractor will determine the exact sampling locations after detailed review of the MIP survey results. The goal will be to perform confirmation groundwater sampling at approximately three to five percent of the equilibrated MIP measurements locations with the primary goal of analyzing groundwater within zones of low to highest detector response, zones at the bedrock interface, and anomalous measurement zones. Discrete groundwater samples will be collected using a Waterloo Profiler™ sampling device at select location and depth intervals by coring with the DPT rig. An attempt to collect a DPT groundwater sample using the Waterloo Profiler will be made for 30 minutes or based on the judgment of the field team. If a groundwater sample can not be obtained efficiently using the Waterloo Profiler, a Geoprobe Screen Point sampler will be used to collect the remaining groundwater samples. This sample method pulls groundwater from a larger vertical interval than the Waterloo Profiler; therefore, a discrete sample can not be collected for the purpose of confirmation of the MIP results. Because groundwater is pulled from a larger interval, however, it is more likely a sample can be collected from a less transmissive lithology. The groundwater sampling points will be placed as close as possible to the original MIP measurement point (generally within a distance of 12 to 18 inches). The MIP confirmation/calibration samples will be analyzed for VOCs by EPA Method 8260. Select groundwater samples may also be analyzed for TPH and PAHs if visual observations and/or the MIP PID/FID detectors indicate its potential presence.

Groundwater samples from Investigation Areas 3 and 4 will be collected using temporary polyvinyl chloride (PVC) well points. The 1-inch diameter, temporary Schedule 40 PVC wells will contain a 5-foot screen interval (0.020-inch machine slot) and probe point at the bottom and be inserted into the boreholes made by the Geoprobe Dual Tube sampling device used to collect the soil samples. The temporary well points will be installed immediately after completion of soil sampling at each location. PVC wells will be installed through the Dual Tube casing and the well left in-place at the total depth of the boring as the DPT casing is extracted. No sand pack or bentonite seal will be placed. Upon equilibration of the water level within the temporary well (water levels will be periodically measured after installation to ensure stabilization), groundwater samples will be collected using the low-flow sampling method by Contractor. The groundwater samples will be sent to the analytical laboratory for 24-hour TAT analysis of VOCs by EPA Method 8260. Upon completion of water level monitoring and groundwater sampling, the temporary wells will be pulled by the Subcontractor and the borings grouted from the bottom up to plug it (see **Section 3.6** for details of borehole abandonment).

Field parameters of pH, Eh, temperature, specific conductivity, DO, ORP, and turbidity will be collected during purging for all groundwater samples. All field observations and descriptions will be recorded on a groundwater sampling form.

Upon completion of groundwater sampling, borings will be grouted by the Subcontractor from the bottom up to plug it (see **Section 3.6** for details of borehole abandonment).

4.4 Borehole Abandonment and Decontamination

Upon completion of each push, the MIP/DPT subcontractor will abandon the completed MIP points to the ground surface with bentonite-grout slurry.

Decontamination of the drill rig, augers, pipes, bits, tools, and all down hole equipment will consist of high-pressure, low-volume steam cleaning at a temporary drilling equipment decontamination pad. A. Detergents, solvents, buckets and brushes will be used as necessary for decontamination of sampling equipment and for the mobile drilling equipment decontamination pad. Tools and drilling equipment to be placed in the drill hole and the rear of the drill rig will be steam-cleaned before drilling begins, between each boring, and after work is completed.

Contractor field personnel will designate a central staging and decontamination area. Wash and decontamination water will be containerized for off-site disposal. Personnel protection clothing and articles will be contained in drums and disposed of separately.

4.5 Quality Assurance/Quality Control (QA/QC)

QA/QC for this investigation will consist of regulatory compliance, subcontractor oversight, investigation tool calibration and confirmation, recordkeeping and reporting, analytical sampling, and laboratory oversight. Site activities will be performed in accordance with all applicable federal, state, and local regulations and standards. The subcontractor will be responsible for obtaining all required licenses, permits, or required approvals to perform the work. The subcontractor will obtain the necessary well permits prior to mobilization. The subcontractors will be working under direct supervision of the Contractor field team. Contractor will select the drilling locations, but drilling will commence only after the drilling location has been accepted by the Subcontractor. Drilling will occur only while the Contractor field team is present.

The MIP subcontractor will ensure that the instruments are tuned and calibrated to the manufacturers recommended conditions prior to beginning work each day. The trip time will be calibrated using a PCE standard each day. The probe depth indicator will be field tested above grade first to ensure proper calibration. Contractor may require additional on-site tests prior to and during subsurface logging to ensure proper instrument performance. As discussed above, confirmation/calibration soil and groundwater samples will be collected to semi-quantitatively compare MIP detector response to laboratory analytical results.

A daily activity log book will be kept to record all on-site activities, personnel, and observations. Detailed soil and groundwater sampling data will be recorded on log forms. MIP and analytical data quality will be reviewed as received prior to incorporation into the database.

5. General Requirements

Buildings, other structures and utilities encountered during the execution of work shall not be disturbed. Contractor will identify the utilities known in the area. Subcontractor shall verify, confirm, and identify all utilities, including any other utilities, above and below

ground, in the areas prior to its work. Subcontractor shall be solely liable for damages resulting from disruption or destruction of utilities due to its work.

Subcontractor shall be responsible for maintaining appropriate security, work zones and access controls (i.e., orange safety fencing) and erosion control measures around all drilling, stockpiles or other areas disturbed by their operations. Subcontractor shall be responsible for keeping trees around the operation area undisturbed.

Open holes shall be barricaded with orange safety fence. All work areas shall be clean and neat. All contaminated and non-contaminated debris, soil and water generated during the course of the work shall be collected, segregated, containerized and removed promptly. Subcontractor shall provide appropriate containers for collecting the waste. Subcontractor shall appropriately and descriptively label each container containing the wastes. Subcontractor shall also be responsible for transporting the containerized waste to a designated location on the facility. Wastes shall be located at an area designated by Contractor, however no waste shall be stockpiled at the work site.

5.1 Utility Clearance

Prior to mobilization, the one-call utility locate service will be contacted to mark all registered utilities within the proposed Investigation Areas. The marked utilities will be checked against the Site base map for accuracy and completeness. If utilities identified on the base map are not marked by the one-call service, they will be marked by Contractor as shown on the drawings and appropriate drilling setbacks applied. A minimum clearance of three feet will be maintained at all drilling locations. Additionally, a minimum distance of 20 feet will be maintained from all overhead power lines.

5.2 Investigation Location Marking and Surveying

Initial investigation locations will be marked using flagged and labeled stakes by Contractor prior to DPT/MIP subcontractor mobilization. Actual sampling locations will be marked with flagged and labeled stakes as they are completed. All final investigation locations will be professionally surveyed for horizontal and vertical control after completion of the DPT/MIP effort. The survey will be performed by a Professional Surveyor licensed in the State of Colorado and will be consistent with the existing base map coordinate system.

5.3 Equipment and Personnel

Drill rig operations should be conducted by a driller licensed in the State of Colorado, experienced in using a Geoprobe™ truck-mounted rig, equipped with MIP/EC. The MIP/EC tools shall be equipped with an ECD, PID, FID, temperature, and soil conductivity detectors.

5.4 Operational Considerations

Several considerations related to the execution of the fieldwork are listed below. These considerations will include, but are not limited to, the following:

- Drilling Location Access

- Several drilling locations are located within concrete pads. The Subcontractor is responsible for being equipped with the appropriate tools and materials to break through the concrete and replace it as original condition.
- Several drilling locations are located within a low overhead clearance building. The access door measures 8-foot high by 7-foot wide. The overhead clearance in the building ranges from approximately 7-foot, 3-inches to 8-foot, 2-inches. The Subcontractor shall provide DPT equipment capable of performing MIP and soil/groundwater sampling within the building.
- Equipment and utility requirements
 - Subcontractor shall be solely responsible for their equipment, instrumentation, materials, and supplies.
 - Water and electricity are available at the site.
 - Site access during the project will be limited to authorized personnel only.
- Site security, including securing of equipment
 - Subcontractor will be responsible for controlling public access into the general project area during working hours, in accordance with its Specific Health and Safety Plan (SHSP).
 - During working hours, the Subcontractor shall be responsible for the security of the work area. The Subcontractor will secure the working area from non-authorized persons with warning tape, orange safety fencing or other appurtenances to prevent unwanted intrusion.
 - During non-working hours, there is no security. Contractor will not be liable for any Subcontractor equipment, instrument or material lost or damaged from the work area. The Subcontractor will be responsible for securing his equipment and other appurtenances at the site. Prevention of theft or loss of Subcontractor's equipment shall be the Subcontractor's responsibility.

5.5 Waste Management

The Subcontractor shall provide proper containers for collection and containerization of trash and general waste generated during the field activities. General trash may be disposed of in trash receptacles located on the base, as directed by Contractor.

The Subcontractor shall contain debris, soil and cuttings generated during the work in 55-gallon drums provided by the Subcontractor. The Subcontractor shall contain organic liquids (e.g., solvents) from aqueous wastes. These liquids (decontamination fluids and other waste-impacted water) will be contained in 55-gallon drums or other appropriate and Contractor-approved containers provided by the Subcontractor. The containers shall be staged in an area designated by Contractor and shall be protected from rainfall and surface water run-on.

The Subcontractor shall be responsible for the staging of the waste containers at a designated location at the site. Contractor will perform the waste characterization sampling, analysis and offsite disposal.

5.6 Health and Safety

Worker and community safety is of the utmost importance on this project. The MIP/DPT subcontractor will comply with the health and safety requirements outlined in the project Health and Safety Plan. All workers involved in any intrusive work or those who may be exposed to subsurface soils, groundwater or waste-impacted materials shall provide evidence of medical certification, respirator fit test, 40-hour and 8-hour refresher Occupational Safety and Health Administration (OSHA) HAZWOPER training to Contractor prior to the start of work. No on-site work by a worker will be allowed until all the information is provided to Contractor.

5.6.1 Personal Protective Equipment

Subcontractor shall be responsible for providing all required personal protective equipment (PPE) for its workers and lower tier Subcontractors in accordance with the bidder's Site SHSP. At a minimum, this shall include steel toe boots, hard hat, and safety glasses, which shall be worn at all times during the work.

A. GENERAL REQUIREMENTS

A.01 Responsibilities (29 CFR 1910.132)

- a. Employees must use all personal protective equipment , which maintains their exposure within acceptable limits as defined in the Health & Safety Plan.
- b. Employers shall ensure that employees receive training in and have knowledge of the use and maintenance of all personal protective equipment , which is required to maintain their exposure within acceptable limits.

A.02 Employees shall be physically able and medically determined qualified to use the personal protective and safety equipment, which may be required in their job duties.

A.03 Personal protective and safety equipment shall be tested, inspected, and maintained in serviceable and sanitary condition.

- a. Defective equipment shall not be used.
- b. Records of any tests or inspection shall be available for inspection by the Contractor (Contractor).

A.04 For Hazardous Waste operations, contractors shall abide by 29 CFR 1910.120

- a. Driller and all other on-site Subcontractor personnel should have current OSHA 29 CFR 1910.120 Training for Hazardous Waste Site Operations (HAZWOPER), have current 8-hour refresher training, and required medical monitoring.
- b. Proof of training in the form of copies of training certificates for all crew members will be required prior to mobilization, and should be submitted as part of the cost estimate.

B. MINIMUM REQUIREMENTS FOR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT

B.01 Clothing protection

Employees shall wear clothing suitable for the weather and work conditions: the minimum for fieldwork shall be shirt, long trousers, and leather steel-toed work boots.

B.02 Foot protection (29 CFR 1910.136)

Steel-toed boots must be leather and must be in compliance with ANSI Z41-1991. Overboots must be worn anytime a liquid hazard is encountered.

B.03 Hand protection (29 CFR 1910.138)

Employees involved in activities which subject the hands to injury (e.g., cuts, abrasions, punctures, burns, chemical irritants, or toxins) shall use hand protection appropriate for the hazard. All jobs requiring basic hand protection shall use leather work gloves.

- a. Jobs that encountered oils, acids, or caustics shall use Neoprene gloves.
- b. Jobs that encountered petroleum products shall use PVC-coated gloves.
- c. Jobs that required protection from a variety of chemicals or splash protection shall use Nitrile gloves.
- d. Jobs that require hand operation of equipment shall use anti-vibration gloves.

B.04 Eye and face protection (29 CFE 1910.133)

Safety glasses, goggles, and splash shields must be in compliance with ANZI Z87.1 1989 standards. Employees shall be provided with eye and face protective equipment when machines or operations present potential for eye or face injury from physical, chemical, or radiation agents.

B.05 Head protection (1910.135)

All jobs that require head protection shall use hard hats that comply with ANZI Z89.-1986. Employees shall be provided with head protection on all construction sites and must wear hard hats at all times.

B.06 Hearing protection (29 CFR 1910.95)

Employees shall be provided hearing protection when subject to sounds above 85db.

B.07 Employees exposed to vehicular or equipment traffic, including signal persons or spotters shall wear apparel marked with a reflectorized or high-visibility material. (i.e., safety vests)

MINIMUM REQUIREMENTS FOR SITE SAFETY

C.01 Safety color code for marking physical hazards (29 CFR 1910.144)

- a. Caution tape shall be at a minimum of 3" wide, yellow, and the words "CAUTION" spelled out legibly in black.
- b. Safety cans or other portable containers of flammable liquids shall be in compliance.

C.02 All signs and tags shall be in compliance with 29 CFR 1910.145.

5.6.2 Facility Site Safety and Security

Workers will be required to comply with the site safety and security rules while working at site. Bidder may be required to provide proof of U.S. citizenship for each employee to

perform work at site. Daily tailgate meetings will be conducted at a site location, to be determined, every workday morning at 7:00 am EDT with Contractor personnel in attendance. All Subcontractors' on-site personnel (including lower-tier Subcontractors) shall attend these meetings. The Subcontractor shall provide documentation of the meeting to Contractor by 5:00 p.m. that same day.

5.7 Facilities

Contractor will provide accessibility to its on site project support facilities including office space, material and equipment storage areas, water, sanitary facilities, etc. needed to support the work activities at the site. Onsite staging/lay down and recovered liquid storage areas will be designated by the facility. The Subcontractor shall be responsible for preparing the designated area, as necessary, for providing and securing any other project support facilities that the Subcontractor may require.

The Subcontractor shall be responsible to have all its equipment properly decontaminated prior to mobilization to the Site. Personnel and equipment shall be satisfactorily decontaminated in accordance with Subcontractor's Health and Safety Plan prior to being removed from site. The Subcontractor shall furnish all equipment to safely and legally collect and store water/solids encountered during the performance of the scope of work described herein. Collected water/solids and any debris or rinsate generated during decontamination shall be properly contained.

5.8 Mobilization

Subcontractor shall mobilize all resources necessary to efficiently and completely perform the scope of work tasks. These resources include, but are not limited to, personnel, equipment, materials, supplies, lower tier Subcontractors and support facilities.

Subcontractor shall be responsible to have all equipment properly decontaminated prior to mobilization to the Site. Personnel and equipment shall be satisfactorily decontaminated in accordance with Subcontractor's SHSP prior to being removed from the site. Any debris or rinsate generated during decontamination shall be properly collected and containerized. Subcontractor shall furnish all equipment to safely and legally collect and store water encountered during the performance of the scope of work described herein for off-site disposal.

Subcontractor shall stage its equipment and temporary facilities within the areas designated by Contractor.

5.9 Changes in Scope/Technical Direction

Contractor requires that Subcontractor submit in writing (along with an estimate of the cost of the change) any notice of change in this scope of work prior to initiating the change. Any work performed by Subcontractor outside the approved scope of work without Contractor's prior written acceptance shall not be considered for compensation.

Technical questions regarding the required scope of services should be directed to the Contractor.

Bid Form
DPT/MIP Investigation
Due Date:

Bidder's Name: _____

Bid Item #	Item Description	Estimated Quantity	Unit of Measure	Firm Fixed Unit Price	Total Price
1	Initial Submittals including H&S Plan and Work Plan	1	Each		
2	Mobilization/Demobilization	1	Each		
3	DPT - Continuous Soil Sampling 3" Dual Tube Sampler (30 ft bgs)	210	LF		
4	DPT - Set and Retrieve Temporary 1" PVC Wells (5' screen) in pre-drilled Macro-Core boreholes (30 ft bgs)	8	Each		
5	DPT - MIP/EC Logging (30 locations to 30 ft bgs)	900	LF		
6	DPT - Waterloo Profiler Groundwater Sampling (avg 30 ft bgs)	8	Each		
7	DPT - Macro-Core Grab Soil Sampling (25 ft bgs)	8	Each		
8	IDW Management (Provide drums, contain IDW, and move to central storage only. Disposal by Contractor)	1	LS		
9	Boring Abandonment/Grouting	1,790	LF		
10	Decontamination	1	LS		
11	Site Restoration (concrete repair) and Final Decontamination	1	LS		
12	Payment And Performance Bond	1	LS		
TOTAL					

Duration of Field Work _____

Bidder certifies that the price(s) specified above represents it full bid amount to complete the work proposed. These prices are valid for 120 days.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Note 1: The bid form provides an estimated quantity of work expected to be performed under the scope of services provided. The estimated quantities represent the information available as of the request for bid issuance date. **These estimates shall not be construed as a guarantee of quantities to the Subcontractor.**

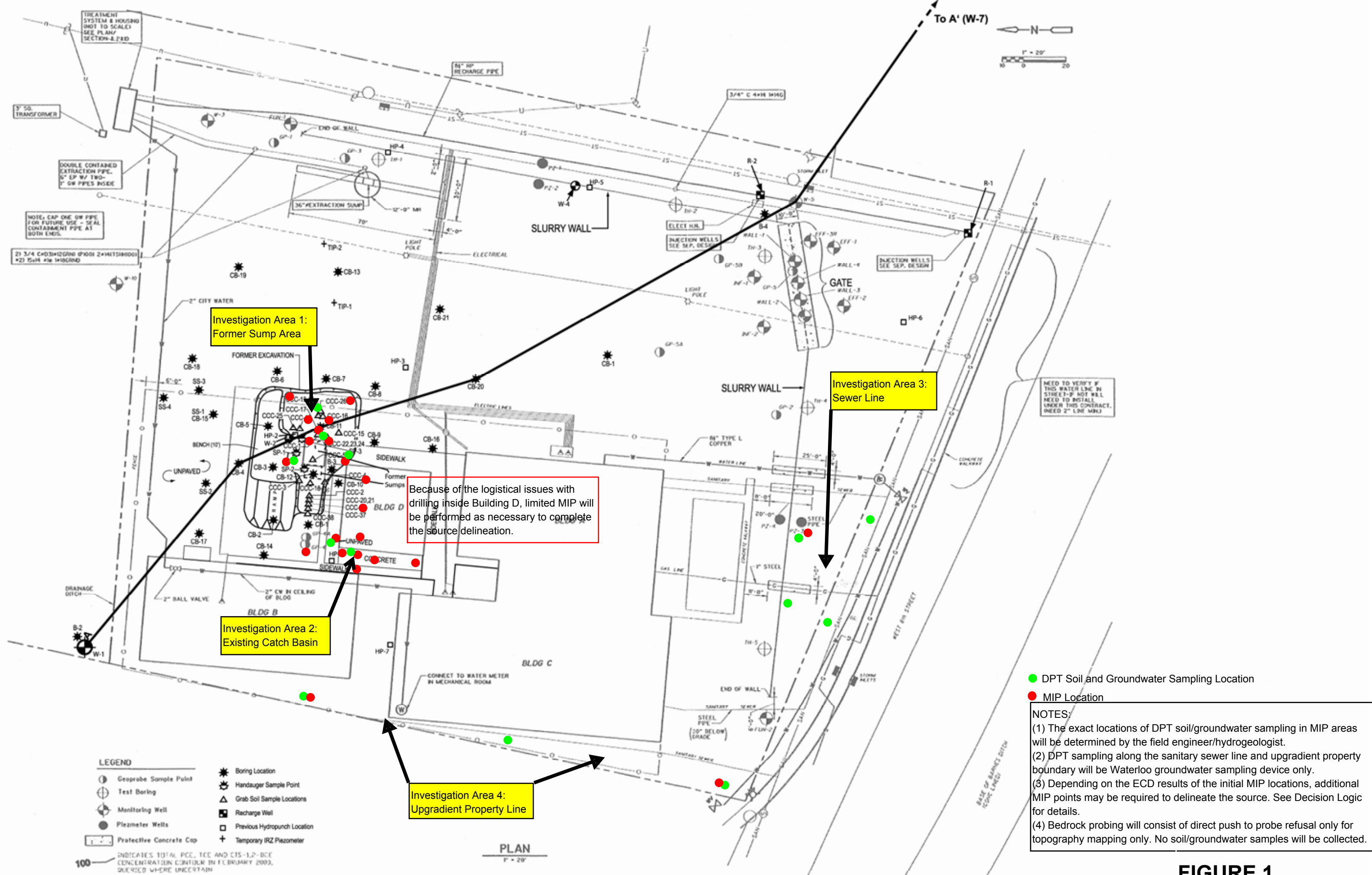


FIGURE 1
Detailed Site Map

FIGURE 2
Source Investigation Decision Logic

