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# Technical Memorandum

**Date** 13 October 2009

**To** Bob Brock (USAED COR), Joe Malen (DPW)

**From** Terry Heikkila, PE, PMP

**Subject** Taku Gardens: Investigation of 1,2,3-TCP Contamination Plume

The objective of this Technical Memorandum is to describe the procedures that will be followed to support the soil, groundwater, and soil-gas investigation of 1,2,3-trichloropropane (TCP) contamination within the drinking water capture zone on the eastern boundary of Taku Gardens, Fort Wainwright, Alaska. In order to achieve this, 6 monitoring wells and approximately 80 GORE modules (passive soil-gas sampling devices) will be installed across the site to help delineate the nature and extent of 1,2,3-TCP contamination (Figure 1). Installation and sampling procedures are presented in this Technical Memorandum, and the results from analysis will be provided for use in the Interim Draft Remedial Investigation Report (to be prepared by CH2M Hill).

## Groundwater Monitoring Well Installation and Sampling Methodology

Boreholes will be drilled via hollow-stem auger to allow for soil sampling and installation of permanent groundwater monitoring wells, which will be installed downgradient of current monitoring wells MW78, MW79, and MW47 (Figure 1). Based on previous drilling activities at the site, difficult drilling conditions are not anticipated. Boreholes will be logged continuously from the surface to final depth. Lithologic logging will be based on the Unified Soil Classification System and standard description procedures (American Society for Testing and Materials 2006) with color matching to the nearest standard soil color. Field screening, using visual, olfactory, and photoionization detector (PID) methods, will be conducted approximately every 2.5 feet. Groundwater is anticipated to be encountered between 11 and 13 feet below ground surface (bgs). The 10-foot screened interval of each well will be approximately centered at the first encountered groundwater. If contamination is suspected, the groundwater monitoring well will not be installed at this location, and the boring will be abandoned. The new location will be upgradient approximately 20 feet.

Analytical soil samples will be collected from within the vadose zone at the location of the highest PID screen, and within the smear zone, approximately 11 to 13 feet bgs. Soil samples will be analyzed for all volatile organic compounds using SW8260B and SW8260 and polycyclic aromatic hydrocarbons using SW8270. The groundwater monitoring wells will be developed in accordance with Alaska Department of Environmental Conservation (ADEC) *Recommended Practices for Monitoring Well Design. Installation, and Decommissioning* (ADEC 1992). Groundwater monitoring wells will be sampled in accordance with Section 3.0 of the *Work Plan for Fall 2008 Remedial Investigation Activities* (CH2M Hill 2008) and *Addendum 4 to the Remedial Investigation Work Plan Groundwater Investigation* (CH2M Hill 2007).

**GORE Module Installation and Sampling Methodology**

GORE modules will be installed concurrently with the groundwater monitoring wells. Three transects of GORE modules plus additional modules randomly spaced between transects will be installed, as displayed on Figure 1. The transects are designed to intersect with MW47 and MW79. Results from GORE analysis (presented in mass) will be compared against known concentrations of 1,2,3-TCP in MW47 and MW79.

The modules will be installed using hand drilling/auguring methods along the transects at an interval of approximately 50 feet to a depth of 3 to 4 feet bgs. The total linear distance of the transects is approximately 2,000 feet. The GORE modules will be installed in accordance with the manufacturer's instructions (Attachment 1). In accordance with the manufacturer's instructions, a 7-day exposure period will be observed, following which the GORE modules will be analyzed for 1,2,3-TCP.

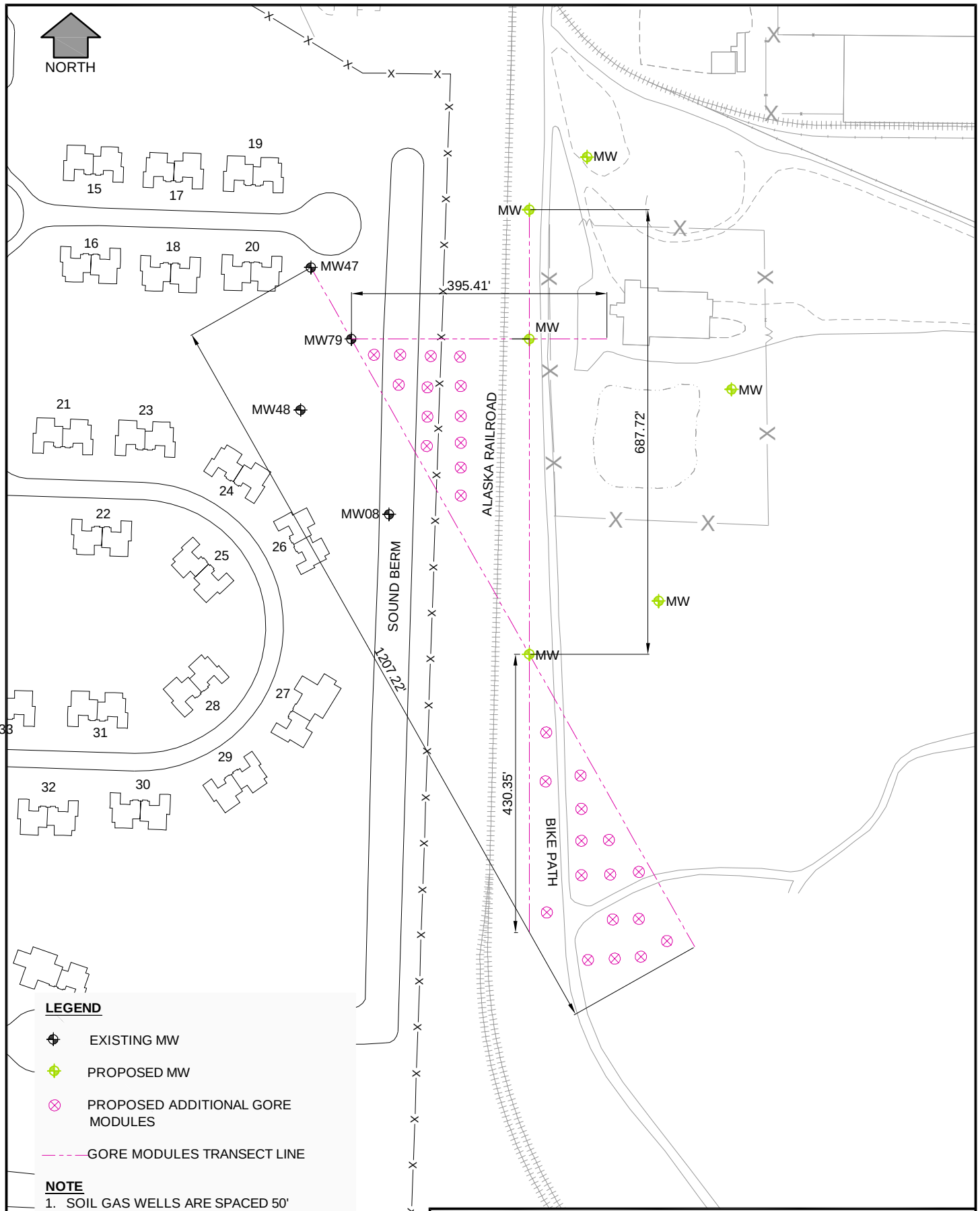
**References**

Alaska Department of Environmental Conservation. 1992 (April). *Recommended Practices for Monitoring Well Design. Installation, and Decommissioning*.

American Society for Testing and Materials. 2006. *Standard Practice for Classification of Soils for Engineering Purposes*. D2487-06e1.

CH2M Hill. 2008. *Work Plan for Fall 2008 Remedial Investigation Activities*.

CH2M Hill. 2007. *Addendum 4 to the Remedial Investigation Work Plan Groundwater Investigation*.




**LEGEND**

- EXISTING MW
- PROPOSED MW
- PROPOSED ADDITIONAL GORE MODULES
- GORE MODULES TRANSECT LINE

**NOTE**

1. SOIL GAS WELLS ARE SPACED 50' CENTER-TO-CENTER FOR A TOTAL OF 80 WELLS.

0 100 200 400

SCALE IN FEET

# FORMER COMMUNICATIONS SITE SOIL-GAS AND MONITORING WELL LOCATIONS

FORT WAINWRIGHT, FAIRBANKS, ALASKA

| JACOBS | DATE: 15 October 2009 | PROJECT MANAGER: T. Heikkila | FIGURE NO.: 1 |
|---|---|---|---|

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**Attachment 1**

**GORE Modules Manufacturer's Instructions**

# Soil Gas & Sub-slab Soil Gas Sampling
## Storage, Installation and Retrieval Guidelines

**NOTE: If you have any questions regarding installation and retrieval, please call:**
**Jay Hodny, Jim Whetzel or Hilary Tretheway**
**(410) 392-7600**

### GENERAL

Always obtain utility clearance before any subsurface sampling.

**Soil Gas & Sub-slab Soil Gas**
For soil gas sampling, the GORE™ Modules can be placed on the surface or installed to any depth, in uncased or cased holes, and can include vertical profiling. The installation hole is sealed effectively against air infiltration with an impermeable cork. The prescribed practice is to place the passive sampler (i.e., the adsorbent) at the desired sampling depth. Generally, for soil gas sampling, depths of three feet or more are favored to minimize the effects of near surface and surface variables (e.g., soil temperature, barometric pressure, air pollution, natural organic content) on the soil gas signal of interest.

Similarly, subslab soil gas can be collected by placing the module at the slab/soil interface, at depth beneath the slab, or both, in permanent or temporary installation holes. An installation hole is advanced through the slab, and sealed with the cork after module insertion. For soil gas and subslab soil gas sampling, the installation is flush with the surface with no equipment remaining on the surface.

Site activities which may disturb the natural soil gas migration should not be conducted during the time when the GORE™ Modules are in the subsurface. Such activities include, but are not limited to, installation/operation of soil vapor extraction systems, drilling (e.g., air-rotary), excavation, air sparging, etc.

**The following items are provided by Gore:**
- shipping container, partitioned box(es) containing individually numbered GORE™ Modules - recyclable cardboard (DO NOT DISCARD SHIPPING CONTAINER OR PARTITIONED BOXES),
- insertion rod (please return after use),
- corks with screw eyes,
- string,
- Chain of Custody and Installation/Retrieval Log
- custody seals
- these instructions.

### STORAGE
GORE™ Modules are carefully cleaned, sealed, and stored after manufacturing. They must remain sealed in their vials in the shipping boxes until deployment and after retrieval. **DO NOT** store near potential sources of organic vapors such as petroleum fuels and exhaust, solvents, adhesives, paints, etc.

### REQUIRED TOOLS/SUPPLIES
A narrow diameter hole (approximately 1/2 to 1-inch; 2.5cm) is drilled or driven to the desired sampling depth. Simple hand tools such as a slam bar or rotary hammer drill are used to create the installation hole in soil. A hammer drill or similar coring tool is required to advance the hole through a slab. Direct-push or auger-type tools are usually needed for deeper installations.

Additional tools (to be supplied by the customer) required for installation may include:
- equipment to lay out and mark sample locations (scaled map, measuring tapes, pin flags, GPS);
- disposable gloves and equipment decontamination supplies
- slide hammer/tile probe (slam bar) or electric rotary hammer drill (AC power outlet or portable generator and extension cords) with carbide-tipped bits or augers (1/2 to 1-inch; 2.5cm diameter, three feet; 1 meter or more, in length).

- Optional: bentonite patching material

If sample locations need to be hidden to prevent damage by vandalism or animals, push the cork farther into the hole, place a metal washer or nut on top of the cork, and covered with soil and sod. Use a metal detector to locate modules for retrieval.

The cork provides an effective seal against infiltration of air in soils and through slabs. For additional security, a thin layer of bentonite can be applied over the cork.

The following vendors supply installation hole drilling equipment. The information is provided as a courtesy and does not represent any endorsement of these products or suppliers:

| Item | Supplier | Phone No. |
|---|---|---|
| * Slide Hammer/Tile Probes | Forestry Supplies | (800) 647-5368 |
| * Carbide Drill Bits (36" long) | 1. Kerfoot Technologies, Inc.<br>2. the Blade Runner | 1. (508) 539-3002<br>2. (610) 444-6708 |
| * Rotary Hammer Drill | SKILL-BOSCH Power Tools | (800) 334-5730 |

* Art's Manufacturing Supply (dba AMS) has all these items (800) 635-7330

TRIP BLANKS

An additional number (specified) of GORE™ Modules are included as trip blanks. The customer selects which modules to be used/treated as trip blanks, and notes this on the Chain of Custody and Installation/Retrieval Log. These modules remain unopened, travel to and from the site during installation and retrieval, and while in storage away from Gore's facility.

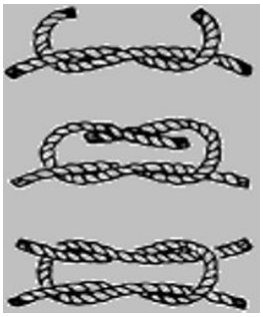
MODULE INSTALLATION

- The sample grid can be laid out beforehand (recommended) or during the module installation. Do not use spraypaint or similar materials to mark locations, or drill through locations marked with spraypaint.
- To facilitate the installation of the modules, it is recommended that the cord and corks be prepared prior to going to the field. As an example, for a three foot installation, cut a piece of the supplied cord to a length of approximately 7.0 feet or 2.25 meters. Tie the ends of the cord together using a non-slip knot (square knot is suggested, Figure 1). Pass the looped cord through the eyelet in the cork and pull it back through itself. Wrap the remainder of the cord around the cork and secure the cord/cork combination with a rubber band. The cork and cord are now ready to attach to the module after the installation hole is created.

*Square knot instructions (Figure 1)*

1. *Take an end of the cord in each hand.*
2. *Pass the left-hand cord over the right-hand cord and wrap it around the right-hand cord.*
3. *Take the cord end that is now in your right hand, place it over the cord end in your left hand and wrap it around that cord.*
4. *Pull the cord carefully to tighten the knot.*

Figure 1. Square Knot



- **We do not recommend installation of modules within 15 feet (5 meters) of monitoring wells, utility trenches or other conduits, unless that is the sampling objective.** These features may act as preferential pathways for soil vapor migration. The results may not be representative of the subsurface contamination.
- Drive/drill the narrow installation hole at the desired pre-marked location. In sandy soils, occasionally the hole will collapse after the drill or tile probe is removed. Adding deionized water to the sandy soil will temporarily compact the soil and keep the hole open for module insertion.
- Wearing clean surgical gloves, remove module from the numbered jar and re-seal the jar. The barcode on the jar lid should correspond with the serial number on the module - please verify.
- Attach the cord and cork to the module by passing the looped cord through the loop on the module and pull the cord/cork back through itself.
- Place the insertion rod into the pre-cut pocket at the base of the module and lower the assembly into the hole. If you encounter resistance remove the module and ream the hole and re-insert the module.
- Once deployed to the desired depth, press the insertion rod against the side of the hole and twist slightly to release the module. Remove the rod and push any excess cord into the hole and plug it with the cork (Figure 2).
- Indicate the module number, date and time of installation and any pertinent comments on the installation/retrieval log. Write the module serial number on the site map adjacent to the appropriate map location.
- **To minimize sample location errors, it is preferable to record the GORE™ Module serial number on the field map. However, if another sample numbering system is used, information relating the sample number system to the GORE™ Module serial numbers must be provided either on the Installation and Retrieval Log, or in a separate table.**
- Clean the tile probe or drill bit and the insertion rod prior to use at the next location. Replace the surgical gloves as necessary.
- Following module installation, the modules selected as **trip blanks** should be kept in the sample box provided and stored as described above in "STORAGE" until sample retrieval.

MODULE RETRIEVAL

- Following the module exposure period identify and check each location in the field using the site map.
- Remove the cork with a penknife, screwdriver or corkscrew. Grasp the cord and pull the module from the ground; **verify the module ID number**. Cut off and discard the cork and cord. Place the entire module to its labeled jar and secure the lid.
- **Use caution when screwing down the lid on the sample jars. Clean any soil/debris from the threads of the jar and lid, and make sure no part of the module is pinched between the jar and lid. Be sure the seal is tight. Over-tightening may cause breakage.**
- **Affix a custody seal to the side of the jar and jar lid. Do not cover the barcode with the seal.**
- Place the jar in the supplied partitioned box.
- Complete the module retrieval date/time on the Installation/Retrieval log.

PACKAGING FOR RETURN

- Place boxes with modules back into outer shipping container using appropriate packing materials to protect fragile contents.
- **Do not** use Styrofoam "peanuts" as packing material. Bubble packing is acceptable.
- Label box to indicate fragile contents.
- There is no need to return the shipment in coolers with ice.
- **Return the GORE™ Modules, insertion rod and paperwork (preferably by overnight courier) to**:

**Screening Modules Laboratory**
**W.L. Gore & Associates, Inc.**
**100 Chesapeake Blvd.**
**Elkton, MD 21921**
**Phone: (410) 392-7600**
**Attn: NOTIFY LAB IMMEDIATELY UPON DELIVERY!!**

**IMPORTANT: Samples should not be shipped for weekend or holiday delivery.**

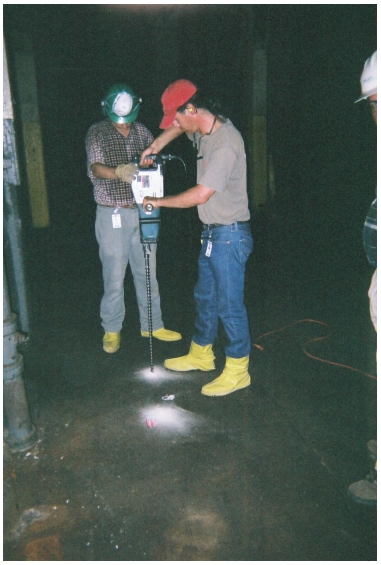
## Soil Gas and Sub-slab Soil Gas Sampling

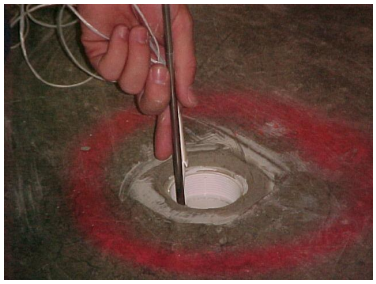
Slide hammer

Rotary hammer drill

Initial insertion

After insertion,
impermeable cork sealed

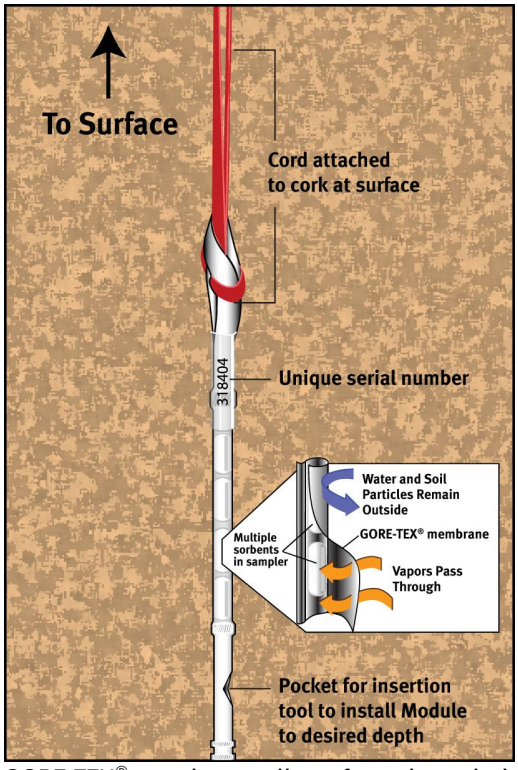




Initial insertion into permanent sampling port.

Rotary hammer drill

Note: Dry cleaner operations continue, no obstructions on surface after installation.




GORE-TEX® membrane allows for unimpeded migration of soil gas to adsorbent, while protecting the adsorbent from liquid water and soil.


GORE
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